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A CANOE TRIP IN THE TEN THOUSAND ISLANDS TO COLLECT LIGUUS

BY PAUL L. McGINTY

For about sixty miles along Florida's lower southwest coast and extending for some distance inland there is a vast almost unexplored region called the Ten Thousand Islands. The great everglade swamp which lies just to the north drains into the Gulf through this low area and in so doing has created the most intricate and baffling maze of mangrove islands and waterways imaginable. Extending to the south is Cape Sable, the most southerly point on the Florida mainland.

To the *Liguus* collector the region presents many hazards. It is only too easy to become hopelessly lost in this natural labyrinth. Oyster-bars lurk just beneath the surface and cannot be seen because of the "black-water" of the mangrove country. Mosquitoes are so numerous that cases of death by mosquito-bite have been recorded, while Cape Sable is reputed to be a haven for rattlesnakes. Apparently nature has done everything in her power to discourage the would-be collector.

After considerable planning my brother Tom and I started out from the little town of Everglades with a heavily laden canoe. In her we had stowed a little tent and mosquito-bar along with food and fresh water enough to last a month, for once we were "in" no more could be had at any price. Then, too, our little outboard-motor needed a supply of fuel. With care, there was room for it all, and although the canoe rode quite low in the water she seemed very steady.

Out on Chokoloskee Bay a brisk wind was chopping things up a bit but we made Chokoloskee Key with only a little water splashed into the boat. After landing upon the southern shore

of the Key a search for *Liguus* was soon in progress. These shells proved to be quite scarce.

The *Oxystyla floridensis,* giant ones lived here, were almost entirely killed by the frosts of this very cold winter. They were still fastened to the trees and in a stage of considerable putrefaction but science must be appeased so we took them just the same. Some of the young ones were still living and these were left to rebuild the colony.

This Key is well covered by scattered "shell-mounds." These strange elevations are rather common throughout the region and are believed to be the rubbish heaps of a prehistoric people who once inhabited these islands. How they ever ate so many shellfish is inconceivable for some of the mounds cover acres. Sometimes they are built in long parallel rows, again they may be in a series of individual hills. On Russel's Key we saw huge pits formed by the mounds which may have been used to collect rainwater. There is a mound near the northern shore of Chokoloskee Key which must be all of fifty feet high. Believe me, that made a lot of oyster stew! A perfunctory search disclosed no implements except the large *Fasciolaria* shells which had been drilled by human hands to take a stick, thus making a sort of primitive garden tool, I suppose.

If the reader is familiar with the mangrove tree he will appreciate the fact that camping upon mangrove islands is impossible, for the roots are actually in the water. Practically the only dry land available for camping is that afforded by these strange piles of refuse. Each day we studied our navigation charts and formulated a schedule which would bring us to a convenient "shell-mound" before nightfall. The larger shells under one's ground-cloth at night seemed to have the peculiar faculty of imprinting upon various parts of one's anatomy quite perfect replicas of their outlines, if you know what I mean.

Since the hammock which supports a growth of either *Liguus* or *Oxystyla* is to be found only upon these peculiar mounds we presume that all of the tree-snails have been introduced since the mound-builders finished their work.

Before leaving Chokoloskee Key we made the acquaintance of a kindly old native known as "Uncle Dick" who presented us

with a "blowing-conch." It was the familiar *Fasciolaria gigantea* with the tip broken off. It is said that its booming note can be heard for a distance of five miles on a clear day. Blown as a bugle, the noise is terrific at close range, although the energy needed to blow it is equally tremendous.

That night we camped upon a shell-mound about a mile up the Turner River. It rained in the night and then turned deucedly cold. Our tent kept out the mosquitoes much better than the rain, we learned.

In the morning, after thawing out by downing several steaming cups of coffee, we started to collect upon the nearby mound for tree-snails. The *Liguus* were very large but decidedly uncommon.

That afternoon we returned to the Bay and after considerable difficulty succeeded in navigating the treacherous shoals and oyster-bars which effectively block the entrance to the Lopez River. Dry land was found about two miles up the river. No doubt it was the only higher ground about, for the remains of an old house were still standing, little but foundation and two cisterns of concrete remaining. In the larger cistern was a goodly quantity of slimy water that reeked with the stench of two raccoons which had in some way fallen into the water and drowned. Built up in front of one of the cisterns was a concrete device bedded into the ground resembling an oblong aquarium such as is sometimes seen on lawns. Roughly scratched into the cement when still soft could be read the inscription "Jael Lopes Born Apr. 20, 1892." No date as to death was recorded but doubtless it is a grave. Never have I seen a lonelier looking one. May Jael's soul rest here in peace.

We camped not far away and upon scratching under the grass found the old familiar shells. This was a "shell mound" which for some reason had only been started. Nevertheless, we were grateful to the mound-builders for it was a little higher than the nearby mangrove swamp and quite dry. Dinner was prepared over a hurriedly built camp fire for it is wise to seek the seclusion of one's tent and mosquito-bar before dark because the bugs come like an invading army with the sundown.

There were many strange sounds in the clear cold air of the night. It seemed that the ever present hooting of the owls was ghostlier than ever. Perhaps the close proximity to the lonely grave had something to do with that.

Upon breaking camp in the morning we continued upon our way up the Lopez River to Cross Bay and then through to Sunday Bay. Near the southern end we at last saw a human being. He was an old 'coon-hunter staying upon a tiny houseboat with a barrel of water, almost as large as the boat, mounted in the stern.

As we buzzed along the noise of our motor frightened countless wild birds into flight. There were many little Florida duck along with the slow starting herons, and numerous graceful ibis, to say nothing of the grotesque pelican and the dainty white egret. This country is indeed a paradise for the bird-lover.

The wind had come up in the afternoon and delayed us in reaching a new camp site. Once in the Chatham River, we hastened, for dusk was almost upon us. As we rounded a bend, there before our eyes stood a good sized frame house with cocoanut palms all around it. What a start it gave us to come so suddenly upon this unexpected sign of habitation.

We camped for the night upon dry land not far from the house, another "shell-mound," to be sure. It is said that the former owner of this little plantation had made a practice of importing negro labor, which if unsatisfactory was simply done away with. The story goes that fifteen skeletons were found upon the premises when the law finally caught up with "Mr. Bluebeard" a few years ago.

In the morning we left the river and headed the little canoe southward in the Gulf of Mexico. It was a bit rough but by exercising care we made out all right. Since our supply of syrup for pancakes had been depleted it was decided to inquire at the clam-dredge working near Plover Key as to our chances of replenishing the larder. This giant dredge supplies the canning-plant at Marco. Such a terrific noise she makes while operating! By shouting at the top of our lungs we told of our plight and one of the men ran off to see the cook. A little later he returned with a partly filled can of syrup which he presented to us, saying he

was sorry they couldn't spare more. No pay was acceptable, but perhaps our appearances had something to do with that. Hugging an outboard-motor day after day certainly doesn't add to one's natty appearance. An adult and a young clam, *Venus mercenaria,* were most acceptable as souvenirs and now have a place in the McGinty collection.

Camp was established upon Highland Point, Lossman's Key, and several days spent in searching for hammocks in the interior. The Point, with a long sandy shore and a very gradual beach, offered greater possibilities to the collector of marine shells. The shallow water swarmed with molluscan life. Fine specimens of the striking crown shell, *Melongena corona,* were everywhere, while in the deeper water that giant of giants, *Fasciolaria gigantea,* with its great blood-red foot fully extended, was searching for living prey.

At night the sand-gnats came through our mosquito-bar and forced us to cover our heads like so many turtles.

A run up the nearby Rodgers River was one of the highlights of the expedition. It was quite narrow and very winding. The river-bank seemed higher here and supported a growth of slender Florida palms which added their grace to the scenery. Around each bend birds would hurriedly take to flight and there was constantly something new to be seen. Off to the left, after we had gone several miles up the river, occasional glimpses of saw-grass prairie were revealed. Here, before our eyes, was being unfolded the real Florida wilds, unspoiled by man! From the Rodgers River we entered Rodgers River Bay and eventually reached the Lossmans River, then out to the Gulf again. A glorious excursion, approximately 20 miles, all told.

Finally we were ready to start on the run for Cape Sable, some 25 miles to the southeast. Upon rounding Shark Point, just north of Ponce de Leon Bay, the sea began to pick up. It was just about all the canoe could stand, for going along with the motor turning at its slowest speed we continued to ship water. For a while we felt a bit squeamish, especially when shark fins were lazily cutting through the water all about our boat. To attempt to "turn about" would surely have put us over and since it was impossible to land because of the mangrove roots

along the shore, we had to keep going. Those sharks seemed to be awfully patient and kept right with us, no doubt waiting for us to turn over. This is a thrill which indeed adds to the zest of conchology.

We eventually made the large Ponce de Leon Bay and breathed more easily. With a pause to bail out the inch and a half or so of water in the canoe, we ran on across the bay, keeping close in to view the giant mangrove trees. A famous botanist stated once in a lecture that he had travelled all over the world collecting botanical specimens but had never seen mangrove trees of such size as these!

At last, before our eyes stretched the sandy beach of Cape Sable! Those Cape Sable *Liguus* had waited a long time for us to come, but now, here we were. Camp was established on Middle Cape, for should the wind become too much for the canoe we could walk the six miles either way to the next cape, that is, Northwest or East Cape.

That night we must have frightened a giant panther prowling near the tent. There was a blood-curdling scream and some large animal bounded off into the night. In the morning we found his tracks upon the soft sand, he surely had been a big one. There were multitudes of other tracks, raccoons and wildcats had been well represented.

If you have ever read Dr. Charles T. Simpson's "In Lower Florida Wilds" and studied his chapter devoted to describing Cape Sable you will appreciate how we felt about the rattlesnakes of the Cape. He implies that they are the largest and most numerous of all Florida! I confess that I trod very gingerly for the next few days and constantly imagined that I could feel those awful fangs fastening upon one of my legs.

There is only a very narrow fringe of hammock at Cape Sable and the tree-snails were far from plentiful. After an exhaustive search upon Middle Cape a very few of the rare *Liguus crenatus marmoratus,* dark colored shells, were taken. These we especially wanted for the collection. Along with the other forms of *Liguus* found were a few very large specimens of *Oxystyla floridensis.* It is interesting to note that while the *Oxystyla* were also taken from East Cape, none were found at Northwest Cape.

At East Cape some very beautiful *Liguus fasciatus roseatus* were taken but they were quite scarce. The mosquitoes were terrific in the hammocks of all three capes.

At Northwest Cape we struck a pure colony of white *Liguus*. This form is supposed to be *Liguus crenatus capensis* and one of its distinguishing characteristics is an elongated shape. Ours did not run very true to form and lacked the green lines usually associated with this variety.

There is a beautiful sandy beach along Cape Sable but the marine collecting was a bit disappointing. "Angel-wings" were plentiful but mostly broken or otherwise imperfect.

The day we left on the home trip a large and very peculiar fish was seen at the surface near Middle Cape. Later, we identified it to our own satisfaction as the exceedingly rare "whale-shark," the largest known fish.

Numerous side trips were made including an unsuccessful attempt to catch a tarpon in the Little Shark River, where it is said they may be had at any season of the year. We went up the Shark and Harney Rivers but found no likely places for tree-snails. The return trip from then on was made all the way in the Gulf of Mexico. When it became too rough to "run" we were obliged to camp and wait for calmer weather; fortunately luck was with us.

Russell's Key, about four miles southwest of the town of Everglades, was visited and many *Liguus fasciatus lineolatus* were observed. Never had we seen *Liguus* so plentiful as here. A number of giant specimens were taken for the collection. Sand-gnats were a pestilence at this place.

The trip was over. We had done what many had told us could not be done. We had been deep into the Ten Thousand Island country of Florida without any guide and had successfully navigated a canoe in the open Gulf of Mexico. Our little craft had carried us safely back after a cruise lasting slightly over three weeks, in which we had covered some three hundred miles of water. For years we had talked of making just such a trip, for it is one of the few absolutely virgin regions left in the United States today. It was our pleasure to see it before it has been spoiled by civilization as it will probably some day be, for tarpon

bring the so-called sportsman, and he brings death and destruction to the wild life wherever he goes. Then, too, we have some very nice specimens of shells to add to the collection, splendid souvenirs of our trip for many years to come, and after all that was the real reason for our adventure.

COLLECTING MOLLUSCA ON THE IRANIAN PLATEAU

BY H. E. J. BIGGS

Little has been written on the Mollusca of the Iranian Plateau. This was perhaps due to the inaccessibility of the interior in the past when the only method of traveling was by caravan. Now this is replaced by motor transport. On the other hand the old method of traveling was good for collecting. In 1922 I made a journey on mules from Ahwaz in the south-west, through Isfahan and Yezd, to Kerman. In more recent years I have traveled several times by lorry from Kerman to Isfahan, from Kerman to Bunder Abbas and from Kerman to Bushire *via* Sirjan and Shiraz. Several summer holidays have been spent in the mountains round Kerman and Yezd and the results may be of some interest.

Zoogeographically Iran lies within the Palaearctic Region. It is in the center of that great belt of deserts which extend from the Atlantic coast of Africa to the eastern side of China, and at the point of change from the hot desert area (Sahara and Arabia) to the temperate area (Turkestan). It also touches the Ethiopian Region on the south-west and the Oriental Region on the south-east. I have collected in the Caspian province of Gilan but its flora and fauna are distinct from those of the high arid plateau. Jagged barren mountain ranges separated by open stony plains covered with low scrub are the characteristic features of this area. Villages are few and far between, sometimes nestling in a mountain valley near a spring, sometimes isolated in the middle of a plain where a qanat (underground water-course) comes to the surface.

To the best of my knowledge the only systematic collecting done in our area was that of Count Doria of the Italian Mission,

and the results of his work were published by Issel in 1865, "Dei Molluschi raccolti della Missione Italiana in Persia." (Mem. Acc. R. Soc. Torino, Ser. 2. Tom. 23.)

My collecting may be divided into two types. Firstly, working systematically over a small area within reach of a camp or the town in which I have lived, and secondly, what one may call the "dash and grab" method used when traveling by lorry. A good illustration of the latter occurred on the road from Bushire to Shiraz. The strain of the ascent of the dangerous Dukhtar Pass was too much for the lorry and the radiator boiled, throwing the cap many yards and covering the machine with hot water. This delayed us some time and working at high speed in a few minutes I had turned a number of stones on the mountain side by the road and secured two or three species of Ena new to me.

In the former class of collecting comes the work I have been able to do round Kerman, a large town in the south, where I have been stationed for the past four years. The town lies on the edge of a plain near the mountains; the former is 5800 ft. and the latter rise another 1000 or more feet. This district has yielded several interesting species. In these mountains in March, 1932, I discovered a small *Cyclotus* which Herr Hans Schlesch of Copenhagen has described under the name *biggsi.* This species will fall into the new genus *Caspicyclotus,* erected by Dr. Lothar Forcart, of Basle, to accommodate *C. sieversi* Pfr. and *C. herzi* Bttg. The active life of *C. biggsi* during each year must be short. From February to March when the snows melt and lichens come to life on these bare mountains the species is active, but for the greater part of the year it remains firmly attached to the hippuritic limestone rocks sheltering from the heat of the sun in tiny cavities. In these same mountains, in rock crevices which support a scanty vegetation, *Granopupa granum* Drap. and *Pupilla signata* Mouss. are to be found together with other pupoid shells as yet undetermined. Further to the southeast of Kerman near Seguch, in similar situations but under slaty rocks, *Ena oxiana* Mts. var. *schahrudensis* Bttg. occurs in profusion.

In well-watered gardens in Kerman *Helicella millepunctata* Bttg. and *Vallonia adela* West. var. *mionecton* Bttg. are abundant, the former particularly so. The streams and qanats of

Kerman yield many species. *Melanopsis doriae* Issel, with its variety *nigra* Biggs. and a brown-banded variety are the commonest shells, followed closely by *Melanoides tuberculata* Müll. *Bythinella uzielliana* Issel is also fairly common. Kerman is the type locality for *M. dorias* and *B. uzielliana* as well as *Theodoxus doriae* Issel. Only one Pelecypod has turned up so far, *Pisidium casertanum* Poli, though *Corbicula fluminalis* Müll. is found in irrigation canals at Isfahan and I cannot understand why such a widely distributed species does not appear further south.

From Isfahan come *Chondrula bayeri* Pfr. and *Theba latonia* Bttg., both of which have not as yet been found further south in Iran. It seems quite unaccountable as conditions are favorable for both species, however, further search in some of the isolated places not yet visited may reveal them. *Succinia pfeifferi* Rossm. abounds in the willow beds by the Zehdeh Rud in Isfahan and it also occurs further north at Qohrud. Again this species has not appeared further south but a fossil *Succinea* found at Bam, 123 miles southeast of Kerman may be referred to this species.

Lymnaea truncatula Müll. has been found in almost all localities where collecting has been done, high up on the side of Shir Kuh at 10,500 ft. and in the warm palm gardens at Bam.

Southwest of Yezd and nestling in a long narrow valley lies the straggling village of Deh Bala. Its general direction is north and south, and the southern end lies between two great mountains Shir Kuh (13,370 ft.) and Barf-Khaneh (13,180 ft.). The sides of these mountains are scored with narrow valleys which in summer contain a mere trickle of water, but there is sufficient for small patches of grass to form at intervals down the valley, while all the rest of the valley is dry. These small spongy areas are good collecting places both for shells and beetles. Under stones in one of these places at about 9500 ft: I found large numbers of *Pupilla muscorum* Linn. and *Vitrina annularis* Stud. On the eastern slopes of Shir Kuh at 10,500 ft. three specimens of *Pisidium cinereum* Alder were found in water-logged ground, this being the highest point in Iran where I have collected mollusks. In a similar habitat, but down in the main valley at 9000 ft., a few slugs lived, this and one other locality near the Pir-i-Zan Pass west of Shiraz, were the only places where I have found

slugs. In the latter case they were living under the fallen leaves of *Quercus persica* J. et S.

In May, 1935, I had occasion to travel to Bushire on the Persian Gulf. Circumstances compelled me to take a very unfrequented road from Kerman to Shiraz *via* Sirjan. Machines pass over this road about once a month in fair weather and in the winter not at all, and the journey is hazardous. Owing to the lorry sinking axle-deep in the Saidabad salt marsh delaying me six hours, much of the journey which should have been by day had to be accomplished by night, and the whole journey was unproductive. However, at Bushire I found one species, *Jacosta tuberculosa* Conrad, in small groups firmly attached to the undersides of stones in the open ground between the British Residency at Sabzabad and the beach. They were in all stages of growth. The return journey to Kerman, which was made *via* Shiraz, Isfahan and Yezd, resulted in several fresh species added to my collection. The road from Bushire to Shiraz is, perhaps, the most dangerous road in constant use in the world. In many places it zigzags up the side of a mountain with no protecting walls. Here and there are drops of many hundred feet into ravines below. These stiff climbs, with the frequent halts to cool the engine, are most wearisome to an ordinary passenger but most welcome to the naturalist. At the bottom of the Dukhtar Pass a long delay gave me the chance to collect a few dead shells of a species new to me for Iran. Up on the pass I took *Ena* (*Petraeus*) *halepensis* Pfr. and two species as yet undetermined but very near the Palaearctic *H. caperata* Mont.

The road from Kerman to Bunder Abbas, the chief port on the south coast, lies through mountain and plain. From 5800 ft. at Kerman it rises and falls again and again till it reaches sea-level. The only locality of interest on this long road (some 360 miles) over which I have passed many times, is Hajjiabad Deraga. Here we are in the region of palms, and a river flows through the village bordered with Oleander and *Calotropis procera* R. Br. At intervals there are dense beds of reeds, but I have never been fortunate enough to have a breakdown near one of these. But at Hajjibad itself *Melanoides scabra* Müll. is found at certain times plentifully, at others not at all. This species

occurs in Seistan near the Afghan border, an Iranian friend having sent me several dead shells from that district. It does not appear further north than Hajjiabad.

Much work remains to be done in Iran. A fairly thorough search has been made at the places visited but the country is so vast and so difficult of access when off the beaten track that it may be some time before our knowledge of the geographical distribution of the species is known with any pretense at completeness.

Generalization would be premature but obviously the molluscan fauna of Iran is predominantly Palaearctic. Isolation tends to cause species to vary and I have a very interesting series of *Melanopsis* taken at various points on the road from Isfahan to Kerman, all varying so much that one would be tempted to put them into different species but for the fact that all intermediate types may be found, joining the small creamy smooth form to the large dark brown wrinkled form. Tentatively I place all these under *M. doriae* Issel. A problem is presented by the species from Aqda which conchologically appears to be near *praerosa* Linn., but if the anatomy could be studied it might prove to be a form of *doriae*. I doubt if typical *doriae* are to be found at Aqda at all. In view of the fact that each mountain mass has its own species of *Dyonisia* (Order Primulaceae) it would not be surprising to find that amongst this long series of sets of *Melanopsis* we have several different species.

Mollusca occur in most ponds and streams in Iran, but as each habitat is surrounded by miles of howling desert there can be little interbreeding, and when any catastrophe wipes out a habitat all the specimens occurring there must disappear. Such was the case in Kerman in July, 1932, when exceptionally heavy rains fell at a time when the ground was hard from months of drought. Floods occurred sweeping over the hard ground and precipitating an enormous quantity of water and loose earth into qanats completely filling them up. At Jelalabad, three miles west of Kerman, was a qanat in which *M. doriae, M. tuberculata* and *Lymnaea lagotis* were to be found in profusion. I visited this qanat shortly after the flood and found it filled with sand and quite dry. When I left Kerman in November, 1935, it had

not been repaired and numbers of dead shells could be seen in the sand. Should this watercourse ever be opened up will it be repopulated with these species, and whence will they come?

SOME MOLLUSCS FROM UTAH

BY S. T. BROOKS

In 1935 Mr. E. R. Eller, Assistant in the Section of Invertebrate Paleontology of the Carnegie Museum, spent some two months collecting recent mollusks and invertebrate fossils in the Uinta Basin, in and around Vernal, Uinta County, Utah. A study of this collection revealed a species and a subspecies new to science and added considerably to the collections of the Section of Recent Invertebrates. I wish, therefore, to acknowledge the efforts of Mr. Eller in behalf of this laboratory and wish to extend my appreciation to Dr. H. A. Pilsbry for his identification of the oreohelices and to Dr. F. C. Baker for his determination of the planorbids and lymnaeids.

1. *Oreohelix strigosa depressa* (Cockerell). Twelve miles north of Wellington. A large form measuring: diameter 26, altitude 14 mm. Salt Lake Meridian. Side Canyon at Dry Fork Canyon, "under rocks in a very dry locality," Range 20 East, Township 3 South, S. L. M. Brush Creek Canyon, R. 21 E, T. 1 S, S. L. M.

2. *Oreohelix subrudis* (Pfeiffer). Grouse Creek, thirty miles northeast of Vernal.

3. *Oreohelix* n. sp. This new species is in Dr. Pilsbry's hands for description. Hominy Creek near Whiterocks, R. 1 W, T. 2 N, Uinta Special Meridian.

4. *Retinella electrina* (Gould). Two and eight-tenths miles west of Vernal on Vernal-Lapoint Road, R. 21 E, T. 4 S, S. L. M. Two specimens, one albinistic.

5. *Euconulus fulvus alaskensis* (Pilsbry). Same locality.

6. *Euconulus fulvus* (Müller). Same locality.

7. *Vertigo elatior* Sterki. Same locality.

8. *Discus cronkhitei anthonyi* (Pilsbry). Same locality.

9. *Succinea avara* Say. Same locality.

10. *Vallonia gracilicosta* Reinhardt. Same locality.

11. *Gyraulus similaris* (F. C. Baker). Same locality. Also Paradise Park Pond, R. 1 E, T. 3 N, U. S. M. The whorls of this form are raised more than in the specimens from Vernal-Lapoint road. Altitude of this locality, 10,000 feet.

12. *Helisoma subcrenatum* (Carpenter). Small pond in the Uinta Mountains along the Vernal-Manila road. Mr. Eller's notes state that the pool was about 150 feet in diameter and with no outlet. The shells occurred in great numbers, "tens of thousands," in piles along the shore. The ratio of this occurrence was *H. subcrenatum,* 1, to *Stagnicola palustris nuttalliana* (Lea), 7. R 22 E, T 1 S, S. L. M.

13. *Stagnicola palustris nuttalliana* (Lea). Collected at same localities as 4, 11 and 12.

14. *Stagnicola palustris wyomingensis* F. C. Baker. Willows Creek, 45 miles south of Vernal; R. 20 E, T 11 S, S. L. M.

15. *Stagnicola caperata* (Say). With *Succinea avara* Say.

16. *Stagnicola bulimoides techella* (Haldeman). Pond seven miles north of Farm Creek near the summit, altitude 10,000 feet. R. 2 W, T. 4 N., U. S. M.

17. *Fossaria obrussa* (Say). Same locality.

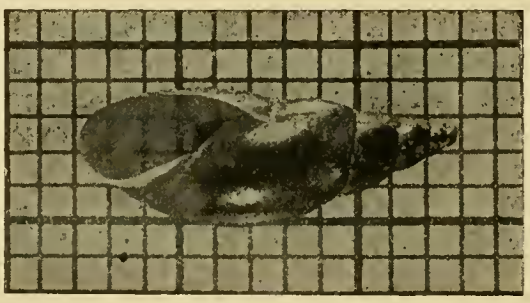

FIG. 1.

18. *Aplexa hypnorum pilsbryi* Brooks. Fig. 1. Type locality: Pond near Whiterocks River at Paradise Creek, Whiterocks Canyon, near Whiterocks, Utah, R. 1 E, T. 3 S., U. S. M. THE NAUTILUS, Vol. 48, p. 100, 1935. Another form of this species which differs slightly from this was found with *Succinea avara,* same locality as no. 4.

NOTES ON HELIX NEMORALIS AT LEXINGTON, VIRGINIA

BY DUNCAN McCONNELL
Washington and Lee University

Helix nemoralis Linné was introduced at Lexington, Virginia, in 1883 from Europe. The new colony found the residual limestone soil of the region a most suitable environment and in succeeding years the colony has spread so that its present areal extent is several square miles.

In 1930 the writer made collections at Lexington in order to determine what changes had taken place since Jas. Lewis Howe recorded the frequencies of the patterns in 1898. These data have been assembled [*Am. Nat.*, 69, 614–620, 1935], but no mention was made of the association of the reddish (or pinkish) ground color with the various patterns.

Of the three series which were examined, *X* was the largest (770 specimens) and was taken near the place of introduction. The frequency of the snails with a reddish ground in this series was 3.9 per cent. Series *Y* was taken about one-half mile south of the place of introduction and consisted of 244 specimens. The frequency of the red shells in series *Y* was 7.4%. In series *Z*, which was taken almost a mile southwest of the place of introduction and was composed of 539 specimens, the red shells were entirely absent.

Howe [*Am. Nat.*, 32, 913–923, 1898] found the variety *rubella* (pink ground) associated chiefly with pattern 00300. Among the 1552 specimens examined in 1930, the association was: 00000, 22 specimens, 6 of which were in series *X* and 16 in *Y*; 00300, 18, 17 in *X* and one in *Y;* 12345, 4, all in *X;* and one each for patterns 123(45), in *X;* $_1$23(45), in *X*; 02$_3$00, in *X* and 003(45), in *Y*.

The red (or pink) ground is more frequent among the three least intricate patterns, but this is not surprising since the frequencies of these patterns, regardless of ground color was:

Band pattern	00000	00300	12345
Series *X*	19.7%	21.1	17.5
Series *Y*	47.9	1.2	16.0
Series *Z*	39.7	1.5	24.0

An observation most difficult to interpret is the absence of the red ground in series *Z*.

OVOVIVIPARITY AMONG MOLLUSKS

BY HENRY VAN DER SCHALIE

While working with a series of fresh-water shells from the Department of Peten in Guatemala it was found that two of the species, both new to science, namely, *Somatogyrus clenchi* and *Cochliopa francesca,* were ovoviviparous. This was particularly striking since, so far as could be determined, this phenomenon has never before been reported for any of the species belonging to the genus *Cochliopa,* and it is only the second time it has been found among species belonging to the genus *Somatogyrus.*[1] In checking through the literature it soon became obvious that, though there are a number of scattered records noting the occurrence of ovoviviparity, there are relatively few publications which deal with the subject in anything but a cursory way. Consequently, an attempt will be made to tabulate briefly such scattered information as was available in the hope that gradually we might arrive at a better understanding of the occurrence and probable significance of this phenomenon among the mollusks.

The lack of uniformity in the use of the terms oviparous, ovoviviparous, and viviparous is a matter of immediate concern. The confusion is somewhat justified since in nature we do not have a sharp separation between some of these processes, and there are cases where it would be difficult to apply any one of them consistently. Though in most instances what is meant is obvious, even when the terms are technically misapplied, it would be well if we first define these terms:

Oviparous: It is proposed that this term be applied to all cases where the eggs are extruded, whether they are fertilized externally or internally.

Ovoviviparous: This is to be applied to any group which hatches its young from the egg before expelling it. This term should obviously be applied in many instances where *viviparous* is used.

[1] Walker (1904, p. 140) found *Somatogyrus georgianus* to be ovoviviparus.

Viviparous: Though this term is almost universally used in cases where ovoviviparous is implied, it should obviously not be used where it applies to groups of the Mollusca. Its use should be restricted to cases (such as among the mammals) where there is a placental or immediate connection between the parent and its offspring.

Of the above three methods of reproduction, only the first two are found among the Mollusca. While most of the groups are oviparous, a surprisingly large number, representing a wide diversity of groups, are ovoviviparous. The Rev. A. H. Cooke (1895, p. 123) has listed a number of species which clearly show how unrestricted this phenomenon is. While it is true that whole groups, such as the *Viviparidae,* tend to be ovoviviparous, the following table will indicate how widespread this type of reproduction really is.

As to the significance of ovoviviparity among the Mollusca there has thus far been little more than conjecture. The general consensus of opinion, however, would indicate that in some instances, at least, the phenomenon represents an adjustment on the part of the organism to unfavorable environmental conditions, and that it consequently is decidedly advantageous to the species in terms of survival. In this connection, Taylor (1894–1900, p. 382) writes, "Certain groups, probably owing to special dangers to their offspring, have acquired the habit of retaining the ova within the body until the hatching has taken place, as in *Vivipara, Anodonta,* and certain species of *Pupa, Clausilia, Helix,* etc., the young being nourished by the secretions of the brood pouch, within which they may remain, as in the *Sphaeriidae,* until they are fully one-third the size of the parent shell."

Another interesting observation has been recorded by Pilsbry and Bequaert (1927, p. 252), "L. Raymond[2] apparently first observed that *Melanoides tuberculata* is viviparous. He stated that the young, newly laid snails spend the night inside the shell of the mother snail within a pouch of the neck of the animal. . . ."

Finally, Otto and Tönniges (1905, p. 415) in their study of the development of *Paludina vivipara* point out, in discussing the

[2] Raymond, L. 1852. Recherches anatomo-physiologiques sur les mollusques de l'Algerie, Journ. de Conchyl., III, pp. 325–329.

young in the uterus in August, that "those forms farthest developed are extruded, while those remaining winter over in the uterus. This maintenance of the young in the body of the mother is an advantageous adjustment, which protects the embryos against injuries, such as drying, and consequently promotes geographic distribution." Van Cleave and Lederer (1932, p. 509), working with *Viviparus contectoides,* essentially substantiate what Otto and Tönniges have reported regarding the wintering-over of certain young in the uterus of the parent.

A few of the genera and species ascertained to be ovoviparous are listed here, from a superficial glance through the literature.

Land snails

Cepolidae: *Oreohelix* (of the typical group). Sagdidae: "*Microphysa vortex.*"

Clausiliidae: *Balea*; *Clausilia ventricosa.* Subulinidae: *Obeliscus*; *Caeliaxis.* Achatinidae: *Limicolaria smithi, Achatina crawfordi.* Valloniidae: *Zoogenetes harpa, Pyramidula rupestris.* Vertiginidae: *Pupilla muscorum, Lauria cylindracea.* Paryphantidae: *Rhytida inaequalis.*

Freshwater mollusks

Melaniidae: *Melanoides lateritia, M. riquetii, M. tuberculata*; *Hemisinus.* Viviparidae, all genera. Hydrobiidae: *Somatogyrus clenchi, S. georgianus; Cochliopa francesae.* Naiades. Sphaeriidae.

Marine mollusks

Volutidae: *Cymbium.* Littorinidae: *Littorina littoralis.* Turritellidae: *Turritella cumberlandia, T. indenta.*

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OXYSTYLA UNDATA UNDATA IN FLORIDA

BY H. A. PILSBRY AND C. N. GRIMSHAWE

This genus of tree snails has up to this time been known in Florida by two species, *Oxystyla undata reses* (Say) and *O. floridensis* (Pils.). The first was described by Thomas Say from a specimen presented by "Mr. Elliott of Charleston" who stated that "it inhabits trees on the south part of Florida." It is now known from the larger keys of the lower group : Key West, Stock Island, Sugar Loaf, Boca Chica, Big Pine, Little Pine, Grassy Key, but we have not seen it from the intervening Key Vaca. In 1907 the senior author collected the largest specimen yet recorded, 61.5 mm. long, on Boca Chica Key. It is commonly about 45 to 52 mm. long.

In November, 1934, one of us (C. N. Grimshawe), found a colony of Oxystyla in hardwood hammocks quite a distance inland on Key Vaca. They were recognized as a new form, differing from *reses,* the ordinary form of the Keys. A series of these shells sent the senior author for examination confirms this conclusion, but a comparison with *O. undata undata* (Brug.) from Trinidad and from the Bahamas (New Providence and Andros),

shows that these Key Vaca shells are exactly like the typical form of *undata*. *O. undata undata* (Brug.) is therefore to be added to the United States fauna. *O. undata undata* was also collected on Sugarloaf Island of the lower chain near Pirates Cove station, one specimen 66.8 mm. long. This shell is exactly like the form *undata* taken on Key Vaca.

The shell is similar to *O. u. reses* but the marking is bolder, the stripes wider, part of them forked below the suture. The stripes are of a blackish brown color under a faintly bluish "bloom." The parietal callus is rich chestnut colored; the apex is marked with a spiral spot of the same color. The length is about 54 mm., diam. 32 mm.

NEW TERTIARY SHELLS FROM FLORIDA

BY MAXWELL SMITH

(Continued from Vol. 49, p. 139)

Pisania (*Tritonidea*) *lymani* M. Smith, Vol. 49, p. 138.

The holotype only, a slightly immature specimen, has so far been obtained and is in the writer's collection. Clewiston, Florida.

Pisania auritula Lam. also occurs, rarely, in the same beds. (Pl. 9, fig. 17). It is a little stouter shell with a larger aperture, the transverse ribs much stronger and farther apart, the spiral threads much more numerous and closer together.

Phos thayerae n. sp. Shell long, narrow, whorls about 10, including 4 of the nucleus which is smooth; on the spire 6 primary spiral threads with finer threads between, arranged in pairs or singly; about 15 primary threads on the final whorl, irregularly placed, finer spirals between these above periphery and adjacent to the short canal; about 10 rounded transverse ribs upon last whorl with about 5 additional finer and closely placed ones adjacent to outer lip; interior of lip strongly lirate and thickened; suture well impressed. Length 20 mm., aperture 8 mm. Pl. 9, fig. 7.

This handsome little shell recalls *Phos parvus* C. B. Adams. It is much more slender, the aperture relatively shorter, the

Note—Plate 9, referred to below, will be found in the preceding number of Nautilus.

whorls more rounded and with a tendency toward development of a shoulder. Dall described, in the Wagner Transactions, from fragmentary specimens a *Phos* from the Miocene of Ballast Point, Tampa Bay, which certainly is not the present species.

The first whorl of the nucleus is absent from the holotype in the writer's collection. Clewiston, Florida. Named in honor of Mrs. Edith Thayer.

Nassarina (?) *proctorae* n. sp. Shell small, whorls about 9, including the 3 nuclear; first nuclear whorls smooth, the third moderately rounded and slightly sculptured; peripheral indentation corresponding in size to that of the suture; about 6 spiral indistinct raised ridges which are almost obsolete between the nodules which, at their intersection, form the stronger transverse ridges. There are numerous very fine and closely placed spiral lines upon almost the entire surface; columella with a half circular indentation, slightly oblique below; canal wide. Length 10 mm. Pl. 9, fig. 14. Clewiston, Florida.

A puzzling little shell. All of the seven specimens taken are not quite mature and adults may show the marginal teeth which characterize *N. glypta* Bush. It appears advisable to describe the present shell and determine its position later. Named after Mrs. Beatrice Proctor.

Fasciolaria scalarina macgintyi n. subsp. Shell large, sutures distinctly impressed, spiral ribs broad, flattened on top, the interspaces mostly slightly wider, 25 of these ribs upon body whorl, axial rounded ribs very indistinct and almost absent on final whorl; canal short; interior of peristome separated and projecting from wall of shell; indentation indicating position of umbilical region; folds on columella irregularly placed; short raised lines both above and below upon the parietal surfaces.

It differs from *F. scalarina* Heilprin by possessing much wider and flatter spiral ribs, the absence of strong vertical rounded ribs, the shorter canal and different inner wall of aperture. Length (estimated) 165 mm. Pl. 9, fig. 9.

Only the holotype was secured and is in the writer's collection. Named after Thomas McGinty. Clewiston, Florida.

Latirus tessellatus seminolensis n. subsp. Shell elongated, slender, spire somewhat longer than aperture; about 18 primary spiral threads and 3 lesser ones; below the sutures short, sharp, close-set transverse threads which are most prominent near the outer lip and become invisible upon early whorls; 7 transverse rounded ribs; outer lip crenulate by terminations of spiral sculpture, lirate within; canal short, narrow, oblique.

Differs from *L. tessellatus* in the fewer spiral threads and transverse ribs, also the shorter canal. Length 30 mm. Pl. 9, fig. 2.

Holotype in the writer's collection. Clewiston, Florida.

Fusus watermani n. sp. Shell narrow, sutures deeply impressed and with a tendency toward crenulation or puckering caused by the termination of the axial rounded ribs which, in turn, are most prominent upon the spire; about 8 of the undulating ribs upon each of the earlier whorls; body whorl with about 18 spiral somewhat shining ribs, some with a pair of incised lines between, especially above and adjacent to the periphery, the spiral ribs strongly marked inside aperture; canal long and slightly sinuous. Length 50 mm. Pl. 9, fig. 16. Clewiston, Florida.

This very elegant shell is totally different from any of the recent or tertiary species. It is an unusually narrow shell; also easily separated on account of the body-whorl contour. Named in honor of Dr. George A. Waterman whose contributions to our knowledge of Maine and Florida mollusks are deeply appreciated.

Marginella clenchi n. sp. Shell narrow, strong, spire well produced; whorls 4–5; suture fairly distinct; outer lip well thickened, the thickening widest opposite the point where sides of aperture most closely approximate, roughly one-half length of shell; 3 strong columellar plaits. Length 12 mm., aperture 8.5 mm. Holotype in the writer's collection. Pl. 9, fig. 12.

Specimens in the National Museum, from Shell Creek, are labelled "new species" possibly in handwriting of Dall.

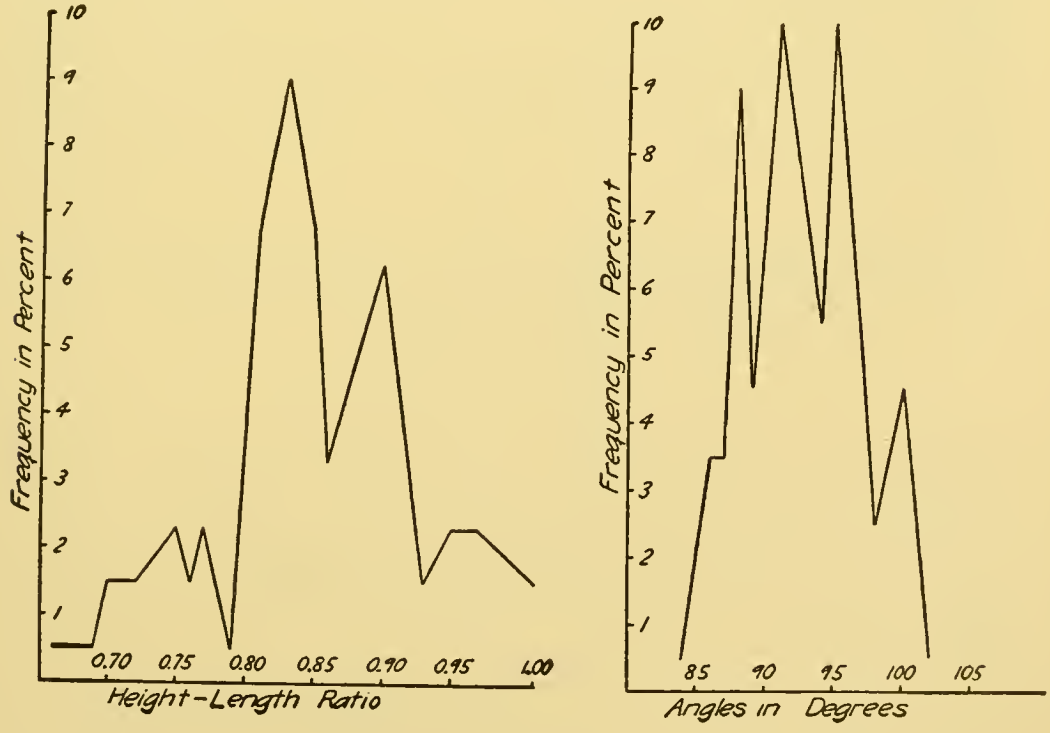
Associated with this species is the name of Dr. William J. Clench, of Harvard University. Clewiston, Florida.

CORBICULA COWLITZENSIS WEAVER

BY RUTH E. COATS
University of Washington

In a publication by C. E. Weaver entitled "Tertiary Paleontology of Western Washington" (Wash. Geol. Sur. Bull. No. 15, 1912, pp. 32, 33, pl. 14, fig. 117 & 119, pl. 15, fig. 131, 132, 135), there are described two new species of *Corbicula* from the Cowlitz Eocene of Washington from Coal Creek, Cowlitz County at U.W. Locality 8. The two new species were differentiated mainly by the variations in the shape of the shell and in the situation of the umbones. Concerning *Corbicula cowlitzensis,* Weaver states "Shell subtriangular in outline, nearly one-fourth longer than high; beaks prominent, elevated and situated about two-fifths the length of the shell from the anterior end." Concerning *Corbicula eufalensis,* he states "Shell sub-circular, about one-fifth longer than high and very thick; beaks very prominent and situated nearly central, sometimes anterior to the center."

As evidence that these so-called new species are probably the same species, the accompanying graphs are submitted. The



shells for the height-length ratios were measured with comparative accuracy with a micrometer. The graph is plotted against the frequency in per cent of the total number of specimens (132). The greater number of specimens indicate relatively higher shells, with the highest number having a ratio of 0.83. The slight variation in outline, which might not be shown by the dimensions, can not be shown well by a graph. However this was observed to have a corresponding distribution and would doubtless fit the same sort of curve.

For the second graph the angle of the umbone was measured by a protractor. Its measurement may be illustrated as follows: Suppose an angle be drawn, the apex touching the umbone, with the legs tangential to the most anterior and posterior extremities of the shell. Errors due to equipment or personal judgment do not exceed four degrees, and since they are not constant they may be ignored. The percentages represented in the graph reach the highest at 91 and 95.

These two graphs show that there is a great variation in the shape of the shell and in the position of the umbones; therefore it is suggested that the species *C. eufalensis* be combined with the species *C. cowlitzensis,* and that the Corbiculas from the type locality henceforth be called *C. cowlitzensis.* If these species were ever to be distinguished again, it would have to be under some characteristic other than that of shape and position of the umbone.

THREE NEW SECTIONS AND RECTIFICATIONS OF SOME SPECIFIC NAMES IN THE PECTINIDAE

BY LEO GEORGE HERTLEIN

During studies of the genera and species of the recent and fossil Pectinidae, it was noticed that several species were in need of rectification of their nomenclature. Three new sections are also proposed.

Swiftopecten Hertlein

Swiftopecten Hertlein, Proc. Calif. Acad. Sci., Ser. 4, Vol. 21, no. 25, 1935, p. 319. Type: *Pecten swiftii* Bernardi, Journ. de

Conchyl., Vol. 7, 1858, p. 90, pl. 1, fig. 1; pl. 2, fig. 1. "Hab. la baie Nicholas, dans la Manche de Tartarie."

This section was proposed to include the well known *Pecten swiftii* group, Pliocene to Recent in Japan, and *P. parmeleei* and related forms in the Pliocene of California.

If Matsumoto[1] is correct in supposing that *P. natoriensis* is the ancestral form of *P. cosibensis* Yokoyama, then this group is apparently not closely related to the *P. pes-felis* group which occurs from Miocene to Recent in the Mediterranean region, and which belongs to the section *Manupecten* Monterosato.[2] That sectional name appears to antedate *Felipes* (Locard) Carus[3] by a few months.

Mr. Thomas Cowles, formerly librarian of the California Academy of Sciences, has kindly taken the trouble to write Mr. A. C. Townsend, librarian of the British Museum, regarding the date of issue of this work. Mr. Townsend in a letter dated September 10, 1932, stated . . . "I find that the date on the original wrapper, which we have preserved, of Vol. 2, Pars 1, Brachiostoma. Mollusca, pp. 1–272, is 1889 [this pagination is written in in manuscript on the wrapper]. A stamp at the top of the wrapper states that the part was received in the Library of this Museum on the 19th December, 1880, so it was probably issued either at the end of November or early in December." "*Pecten pes felis* Lam." occurs in the faunal list followed by parentheses containing the names of species which were apparently considered to be synonyms. These were "(Ostrea pes-felis L., P. elongatus Born, O. corallina Poli, P. Bornii Payr.)," "(Var. alipus De Greg., Sicilia)."—Dall, Trans. Wagner Free Inst. Sci., Vol. 3, pt. 4, 1898, p. 696–697. *Felipes* cited "with *P. pesfelis* L. as the type."

Pecten swifti has been referred to the section *Pallium* by some authors, but it has been pointed out by Cox and others that

[1] Sci. Rept. Tohoku Imp. Univ. Sendai, Japan, Ser. 2 (Geol.), Vol. 13, no. 3, 1930, p. 104, pl. 40, figs. 10 and 11.

[2] Journ. de Conchyl., Vol. 29, no. 1, January, 1889, p. 21. Species included in original list: *P. pes-felis, P. radula, P. tigris, P. fulvicostatus.*—Monterosato, Journ. de Conchyl., Vol. 47, no. 3, 1899, p. 190. "Type: *P. pes-felis*, auct."

[3] Prod. Faunae Mediterr., Bd. 2, 1889, p. 71.

Pallium Schumacher with the type *Pecten plica* Linnaeus, can not be used due to the earlier *Pallium* Schröter (Archiv. für Zoologie und Zootomie, Bd. 3, 1802, p. 135). If *Pallium* of Martini is not accepted, then *Decadopecten* Rüppell in Sowerby,[4] can be used for the section which has *Pecten plica* as type.

Anatipopecten, new section

A group somewhat similar in form to *Manupecten* and *Swiftopecten* but which occurs in the Tertiary of eastern North America can be placed in a new section *Anatipopecten,* with *Pecten anatipes* Morton[5] as type.

Dendopecten, new section

Type, *Pecten dendyi* Hutton, Trans. New Zealand Inst., Vol. 34, 1902, p. 196, pl. 8. "In a calcareous sandstone, Chatham Island."—Marwick, Trans. New Zealand Inst., Vol. 58, 1928, p. 458, fig. 29. "Momoe-a-toa."

This section is present in the New Zealand later Tertiary and is known in beds of Miocene or possibly upper Oligocene age. *P. burnetti* Zittel, appears to belong to this group as well as the Recent *P. convexus* Quoy and Gaimard. These forms do not appear to be closely related to the Mediterranean *P. pes-felis* group which belongs to the section *Manupecten* Monterosato. The New Zealand group bears some resemblance to *Peplum* Bucquoy, Dautzenberg and Dollfuss[6] and to *Flexopecten* Sacco.[7] For convenience the New Zealand group is placed in the separate section *Dendopecten.*

[4] *Decadopecten* Rüppell in G. B. Sowerby, Conch. Manual, 1839, pp. 37, 78, 121, fig. 172. Type by monotypy, *Pecten plica* Linnaeus. This was spelled *Decatopecten* in the original, but in later editions of Sowerby's manual it was spelled *Decadopecten.* Sherborn indicated that the original spelling was "[*err. typ. pro* Decado-]." *Dentipecten* Rüppell in J. E. Gray (Proc. Zool. Soc. London, 1847, p. 200. Type by monotypy, *Pecten plica* Linnaeus) is an exact synonym of *Decadopecten.*

[5] *Pecten anatipes* Morton, Amer. Jour. Sci., Vol. 23, no. 2, 1833, p. 293, pl. 5, fig. 4. "From the overlying limestone of Claiborne, Alabama."—Cook & Mossom, 20th Ann. Rept Florida Geol. Surv., for 1927–1928 [issued 1929], p. 69, pl. 7, fig. 2. Glendon Limestone, Holmes County, Florida. Oligocene.

[6] Moll. Marine du Rousillon, Vol. 2, 1889, p. 67. "Type: *P. clavatus* Poli." As pointed out by Harris (Bull. Amer. Paleo., Vol. 6 (Bull. 31), 1919, p. 25), *Pecten pulchricostus* Aldrich & Meyer from the Eocene of Mississippi is quite similar to the recent *Pecten clavatus* Poli from the Mediterranean.

[7] Moll. Terz. Piemonte y Liguria, Pt. 24, 1897, p. 39. "(tipo *F. flexuosus* (Poli))."

PETHOPECTEN, new section

Type, *Pecten (Chlamys) Széremensis* Pethö, Foldtany Intézet kiallitasi targyi etc. (expositio millenaris Hungaricae), 1896, no. 55, p. 32.—Pethö, Palaeontographica, Bd. 52, 1906, p. 208, pl. 15, figs. 2, 3, 3a, 3b. Cerevic, Hungary. Senonien of the Peterwardeiner Gebirges.

This group is typified by *P. széremensis* Pethö, which has a very short hinge in proportion to the height and length of the shell, a rather sharp apical angle and a somewhat oblique form. The type has about eight to ten ribs, and on these, a number of projecting scaly spines appear in the earlier stages of the shell. Apparently *P. krenneri* Pethö also belongs to this section.

PECTEN SINOMARINUS, new name

Pecten ambiguus Bavay, Journ. de Conchyl., Vol. 52, no. 3, October, 1904, p. 198, pl. 6, figs. 15 and 16. "mare sinense boreale." Recent. Not *Pecten ambiguus* Münster, in Goldfuss, Petref. Germaniae, Th. 2 (4), 1833, p. 46, Tab. 90, figs. 5a, b. "Findet sich im unteren Oolith bei Gräfenberg im Baireuthischen." [Jurassic]; not p. 64, Tab. 96, figs. 2a, b, c. "bei Bünde." [Oligocene.]

The specific name *ambiguus* was applied to a species of *Pecten* from Jurassic beds, and on another page to an Oligocene species in Germany by Münster whose use of the name is much earlier than that of Bavay. Münster's species is usually classified under the subgenus *Chlamys* and in that case Bavay's use of *ambiguus* is untenable. The name *sinomarinus* is here proposed for the Chinese species. As indicated by Bavay, the species appears to belong to the group which includes *Pecten hirasei* Bavay, *P. singaporinus* Sowerby and *P. tranquebaricus* Gmelin.

(*To be concluded*)

BRYANT WALKER, 1856–1936

We are grieved to announce the death in May after a prolonged illness, of a life-long friend and a frequent contributor to the pages of this journal. A biographic sketch will appear later.—H. A. P. and H. B. B.

JOHN HENRY GATLIFF

In the death of John Henry Gatliff on September 14, 1935, at the age of 87 years, Australia has lost a veteran conchologist, author of numerous papers on Victorian mollusks, and affectionately known in Australia as the "father of Victorian conchology." Many of his papers were published in collaboration with C. J. Gabriel. The Catalogue of Marine Shells of Victoria (Proc. Royal Soc. S. Australia) by Pritchard and Gatliff is a standard work on this fauna. His first paper was published in 1887. When in Melbourne in 1923 the writer had the great pleasure of visiting Mr. Gatliff in his home where, surrounded by books and specimens, he was a most likeable and generous host. He possessed a collection of more than 7000 species. The Victorian shells, which alone could be gone over in two evenings, are remarkable for beauty and perfection of the specimens. He was recently appointed Honorary Conchologist to the Natural Museum, Melbourne. A portrait may be found in the *Victorian Naturalist* for October.—H. A. P.

HERBERT N. LOWE

West Coast conchologists, and all of us who enjoyed his friendship, have suffered a severe loss in the death of Mr. Lowe, June 10th. An account of his life and scientific work will appear later. —H. A. P.

NOTES AND NEWS

EXACT DATES OF THE NAUTILUS.—*Volume* 49 (1): pp. 1–36, pls. 1, 2, was mailed July 22, 1935; (2): 37–70, pls. 3, 4, Nov. 8, 1935; (3): 71–106, pls. 5–7, Jan. 30, 1936; (4): 107–142 (+vii), pls. 8, 9, May 1, 1936.—H. B. B.

MELONGENA CORONA (Gmel.) has been taken by Mr. J. H. Beal in Santa Rosa Sound about a mile from the U. S. Quarantine Station on Santa Rosa Island, western Florida. The specimens sent are the typical form of the species, like pl. 12, fig. 4, NAUTILUS, Vol. 47, 1934. This is further north and west than any specimens or records I had seen.—H. A. P.

"IT WAS A GREAT DAY."—During the winter of 1934–5 a local boy brought me a very beautiful paper-thin shell the size of a small hen egg. It was the most fragile and beautifully striped shell I had seen up to that time. It had been found on the beach of Lantana, Florida, and was quite fresh, and it now rests in the collection of our best customer-friend at Palm Beach, near its lifetime home. Knowing it to be an unusual find for this locality, we three Lymans—Frank, Vera and Jack—made it a point to impress the appearance of this shell on our minds, so that we might focus our vision for finding the living specimens which we knew must be here. It was only natural that, on that long-remembered day, June 1st, 1935, we should say "let's find a living *Hydatina physis.*" Of course we did not believe we could; so imagine, you old timers, how we pranced around when Mrs. Lyman found, not one, but *two* living specimens in a small hole surrounded by about 6 inches of water and "turtle grass" on the bar at our famous "Treasure Island" (in Lake Worth). All the specimens found were nested and hidden in small holes about 6 feet in diameter, full of water and turtle grass, the water around them about 6 inches deep. Turtle grass is the name given to a greenish-brown grass abundant on the sandy mud bottom of Lake Worth, so called because the sea turtles are said to eat it; the sea cows (manatees) also find it a choice food. The color of the *Hydatina physis* blends well with it. Were it not for the truly marvelous patterns of the animal in and enveloping the shell there could be no more perfect camouflage. Finding the hydatinas in such shallow water we were led to believe that they came in on warm days to breed.

After a somewhat diligent search one other *Hydatina* was found. In all, during the whole summer, six good specimens were taken. June 1st, 1935, was one thrill after another. The

sun was hot. The bar was out, the tide being extremely low. Imagine us finding *in Florida,* hydatinas, xenophoras, architectonicas, the most vividly colored specimens of *Cardium serratum* ever beheld, *Astrea longispina* and many other good shells, all living. It was a great day!—Frank B. Lyman.

Xesta and Naninia.—*Xesta* Albers [1850, Die Heliceen: 58; Albers-Martens, 1860, ed. 2: 50 ("Typus: N. stuartiae Sow.—N. citrina Linn.")] has as type by subsequent designation of Kobelt [1880, Ill. Conch.: 215], *Nanina stuartiae* = *Helix stuartiae* "Sow." Pfr. [1845, Zeitschr. Malak. 2: 154] from Celebes. Unless an earlier type designation than that of Kobelt can be found, *Xesta* seems to be attached to a species of which the animal is unknown but which has a shell very much like *Asperitas* Gude [1911, Proc. Malac. Soc. London 9: 273], with type, by original designation, *Xestina rugosissima* Mlldff., from Roma, Malay Peninsula. In any case, the correct generic name for *Xesta* as generally used, *i.e.,* with type by subsequent designation of Fischer [1883, Man. Conch.: 461], *Ariophanta citrina* Linné [= *Helix citrina* L., 1758, Syst. Nat. X: 771, from Amboina], is *Naninia* "Gray" Sowerby [1842, Conch. Man., ed. 2: 198, 302], an emendation for and thus taking the type of *Nanina* Gray [1834, Proc. Zool. Soc. London: 58], type by subsequent designation of Herrmannsen [1847, Ind. Malac. II: 92], *Helix citrina* L. *Nanina* Gray is preoccupied by *Nanina* Risso (1826).—H. Burrington Baker.

The Relationship of Parapholyx.—In 1870, Dall published a paper on Pompholyx (Parapholyx) and gave figures of its anatomy (Ann. Lyc. Nat. Hist. N. Y., IX, p. 335). These figures and the description were quite inadequate, but between that time and the present no additional figures have been published. Recently *Parapholyx effusa* has been dissected and its anatomy studied. It is related to *Helisoma* and a member of the subfamily Helisomatinae. There is a distinct penial gland and a short external duct. The musculature of the penial complex resembles that of *Carinifex,* and there is much in common between the two genera. The gland and duct are different from

these organs in *Helisoma* and there are differences in the prostate and ovotestis. *Parapholyx* stands as a valid genus related to both *Carinifex* and *Helisoma* but differing from both. Of course, these facts invalidate the old subfamily Pompholiginae of Dall and this group must necessarily be eliminated from Planorbid nomenclature. Specimens of *P. effusa effusa* (Lea) from outlet of Upper Klamath Lake, Oregon, and *P. effusa diagonalis* Henderson from Crater Lake, Oregon, both species collected by Professor Junius Henderson, have been examined.—Frank C. Baker.

Succinea Carried by a Bird.—For ten days in the beginning of February, the Museum had a collecting party of four in the field under the leadership of L. M. Huey, Curator of Birds and Mammals on the Museum staff. The base camp was established ten miles south of Gila Bend, Arizona, in a desert region that has hitherto received but little attention from naturalists. A unique capture was that of a tiny fresh-water mollusk, *Succinea,* found "hitch-hiking" in the back feathers of a Western Vesper Sparrow. We are all aware that birds are the medium of transplanting seeds; but here seemed to be evidence of possible avian transplantation of a living organism—the first encountered by Huey in his 25 years of field experience.—(The Natural History Museum Bulletin, Balboa Park, San Diego, Cal., No. 112, March, 1936).

PUBLICATIONS RECEIVED

Fossil Non-marine Mollusca of North America. By Junius Henderson. Geological Society of America, Special Paper Number 3, 1935. 313 pp. Malacologists and paleontologists have long needed a catalogue of fossil land and fresh-water mollusks, as there has been no resumé of the widely scattered data since C. A. White's *Review* in 1883. Dr. Henderson's work comprises a systematic annotated catalogue with references to the entire literature, lists by formation and locality, and a bibliography. In the latter we miss reference to Wenz's "Gastropoda Extramarina Tertiaria," in Fossilium Catalogus, which includes American species. The labor involved in compiling such a catalogue is very

great. Henderson's work through many years has dealt with both the geological and the taxonomic sides, and has been supplemented by extensive field work. He is to be congratulated upon the production of so useful a book of reference.—H.A.P.

Checklist of Florida Marine Shells. By Norman W. Lermond. Published by the author, 1936. 56 pages. This list includes only such species as are to be found on the beaches and reefs, omitting deep water forms which never come ashore. It was compiled mainly from the collections of A. G. Reynolds, C. B. Lungren, C. C. Allen, D. L. Emery and the author.

Timothy Abbott Conrad. By Harry E. Wheeler. (Paleontological Research Institute, Ithaca, N. Y., 1935). 157 pp., 27 plates, text-figures and 2 maps. Conrad is generally regarded as the founder of Tertiary paleontology in America, and for many years he was the principal worker. Even now, more than 100 years since his first paper, and nearly 60 since his death, his works on the Atlantic Coast Miocene and the Alabama Eocene are in constant use. His work on fresh-water shells is also important, though far less extensive. Mr. Wheeler's volume leads the reader through Conrad's life, step by step. His collecting and geologizing expeditions, his friendships, trials, successes, are recorded with sympathy and understanding. To those working today on the foundations Conrad laid it is all most interesting. Mr. Wheeler's researches have brought much new material to light. He has produced a history worthy of the greatest American Tertiary paleontologist of his times.—H.A.P.

Land and Fresh Water Shells of Aroostook County, Maine. The History of the Lymnaeidae of the Northern Part of Maine. By Olof Olsson Nylander. Caribou, Maine, 1936. A list in mimeograph form, with notes and much interesting and useful information, ecologic, historical and personal.—H.A.P.

A Handbook for Shell Collectors. By Walter Freeman Webb. St. Petersburg, Florida, 1935. Long known to shell collectors all over the country for his stock of shells for sale, Mr. Webb has now assembled woodcuts of 1100 species of shells from

all seas and countries, with a breezy and informal descriptive text, in this book of 130 pages, which is sold for $1.00. We are informed that a second edition is in preparation, in which errors which found their way into this one are to be corrected. A book for beginners in shell collecting.—H.A.P.

The Atlantic and Gulf Coast Tertiary Pectinidae of the United States. By H. I. Tucker. American Midland Naturalist, Vol. 17, March, 1936. 4 plates. A revision based upon materials in all the type collections in this country and abroad. As the pectins are important "Leitfossilien," this thorough and reliable work will be much used and appreciated.—H.A.P.

"Basteria," a New Journal of Malacology.—The Netherlands Malacological Society initiated on February 1, 1936, a new journal under the title of "Basteria." Each volume is to be published in four parts, the volume to coincide as nearly as possible with the calendar year. Papers will be published mainly in Dutch, with a brief summary in another language. Its scope will be wide, embracing the entire field of malacology in all of its biological aspects, as well as general papers on taxonomy. Subscription to the journal (2.50 florins) should be sent to Dr. F. P. Koumans, Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands.—W. J. Clench.

THE SIXTH ANNUAL MEETING OF THE AMERICAN MALACOLOGICAL UNION

One of the most delightful gatherings in the history of the American Malacological Union was the sixth annual meeting held in St. Petersburg, Florida, from Tuesday through Friday, April 21 to 24, 1936. The Detroit Hotel in this famed "Sunshine City" was headquarters for the convention and in its pleasant halls all sessions were held. Thirty-three members were in attendance as well as many local shell lovers. The meeting was opened on Tuesday morning with addresses of welcome by the Hon. John S. Smith, mayor of the city, M. M. Deaderick, secretary of the Chamber of Commerce, Roy Hanna, vice president of the Pinellas Institute of Natural Sciences, D. L. Emery, president of the St.

Petersburg Shell Club, and Capt. W. A. Read, at whose invitation the meeting was held in this city. Calvin Goodrich, president of the Union, responded and the presentation of scientific papers followed.

The first of these was by Junius Henderson, entitled, "Is Concealing Coloration Important to Molluscan Life?" A paper by Dr. A. Myra Keen of Stanford University on "The Status of the Family Cardiidae" was read by Dr. J. P. E. Morrison, and completed the first session. Mr. Joshua L. Baily, Jr., in his paper, "The Stabilization of Scientific Nomenclature," read in the afternoon, made a plea for the appointment by the Union of a committee of experts to pass on questions of nomenclature, asking that the subject be discussed and considered at a later date. Dr. Paul Bartsch spoke on "The Intermediate Hosts of the Asiatic Blood Fluke," illustrating his subject with lantern slides. "The Evolution of Genus *Liguus* in Florida" was the topic presented by Henry G. Frampton, of Miami. A beautifully arranged series of these shells illustrated the talk, giving a graphic view of the relationships of the forms.

The evening lecture was given by Dr. Henry A. Pilsbry on "Three Naturalists in Mexico." This was illustrated with lantern slides and was a delightful account of Dr. Pilsbry's experiences during two summers spent in studying and collecting mollusks in northern Mexico.

Reading of papers was concluded on Wedenesday. Dr. Carlos de la Torre was the first speaker. His subject, "A Revision of the Cuban Genus *Polymita,*" was illustrated with a large series of 2,800 shells of this beautiful and variable mollusk, arranged in 28 glass-covered trays. At the suggestion of Dr. Pilsbry, a resoluwas passed recommending the publication by the Carnegie Institution of Washington, of Dr. de la Torre's studies and the splendid color plates with which it was also illustrated.

At the afternoon session several papers were presented. Dr. A. La Rocque, of the National Museum of Canada, read a paper on "A Plan for the Study of Canadian Mollusca." Dr. J. P. E. Morrison, of the United States National Museum, spoke on "Growth Rings and Size of Shells," illustrating his paper with charts. "Shell Collecting in Florida" was the subject of a short talk by

D. L. Emery, of St. Petersburg. Mrs. Ida S. Oldroyd, of Stanford University, spoke briefly on "An Interesting Oyster from the Olympian Beds." The shell in question was exhibited. Dr. Bartsch read a paper prepared jointly with Dr. Harald A. Rehder, of the United States National Museum, on "Recent and Fossil Pelecypod Fauna of the Hawaiian Islands" illustrated with lantern slides. This gave the results of studies on Mr. D. Thaanum's collection which had been given to the Smithsonian Institution. "The American Genus *Oreohelix*" by Prof. Henderson, illustrated with lantern slides, concluded the formal papers. The evening session was given over to informal talks. Dr. Frank Smith, of the University of Illinois, spoke delightfully on "Earthworms," a subject in which he is a recognized authority. Miss Anne Harbison, of Philadelphia, gave an interesting account of her work with Dr. Pilsbry on fossil shells. Calvin Goodrich told of his having been an amateur in the field of molluscan study for many years before he became professional, when he retired from teaching and took up museum work. Walter F. Webb, of Rochester, N. Y., and Capt. Read also contributed interesting remarks on experiences in their pursuit of conchology.

On Thursday morning the members left the Detroit Hotel at 10 o'clock for an auto trip to Tarpon Springs. Here they were met by Mr. E. Macrenaris, veteran sponge diver, who gave a history of the Greek sponge industry in Tarpon Springs, which boasts the largest sponge fishing fleet and the largest sponge exchange in the world. Lunch at the Green Garden Restaurant and visits to numerous curio shops followed, then a tour of the Gulf beaches to collect shells with a return to the hotel in time for the annual dinner. Dr. Paul Bartsch presided in the absence of the president, Calvin Goodrich, who was obliged to leave early to return to Michigan.

A business session followed the dinner. It was decided to accept with pleasure the invitation extended through Mr. Goodrich to hold the meeting next year in the University of Michigan. Dr. Carlos de la Torre invited the Union to meet in Havana in 1938. This invitation also was unanimously and enthusiastically accepted. Harold R. Robertson of Buffalo was delegated to draft a resolution to be presented to the Carnegie Institution of Wash-

ington asking that they consider the preparation and publication of a biography of the late William Healey Dall. Capt. W. A. Read then was presented with a book containing the autographs of all members in attendance at the sixth annual meeting in token of their appreciation of his invitation to St. Petersburg and his untiring efforts to make the meeting the success which it had been.

After calling on various speakers and the passing of a resolution of appreciation to be sent to the mayor of St. Petersburg, the St. Petersburg Chamber of Commerce, the local press, the St. Petersburg Shell Club and the Detroit Hotel management and personnel, Dr. Bartsch asked that before adjournment the assembled company bow their heads for a few moments in silence in memory of those valiant souls who have gone, among them William Healey Dall, John B. Henderson, Charles Torrey Simpson and Victor Sterki.

On Friday the visitors were guests of Capt. Read on his yacht *Casanova,* visiting Shell Island, a favorite haunt of shell collectors, a delightful two hours' distance from St. Petersburg across the waters of Tampa Bay. Returning to the city in the evening farewells were said and the sixth annual meeting had passed into history.

Council for the ensuing year was elected as follows: Honorary Presidents: Ida S. Oldroyd, Stanford University, and Henry A. Pilsbry, Philadelphia Academy of Natural Sciences; President, Joshua L. Baily, Jr., San Diego, California; vice-president, Carlos de la Torre, University of Havana, Cuba; corresponding secretary, Norman W. Lermond, Knox Academy of Arts and Sciences, Thomaston, Maine; financial secretary, Imogene C. Robertson, Buffalo Museum of Science. Other members of the Council: Paul Bartsch, United States National Museum, Calvin Goodrich, University of Michigan, William J. Clench, Museum of Comparative Zoology, Cambridge, Mass., Junius Henderson, University of Colorado.

Imogene C. Robertson,
Financial Secretary.

BRYANT WALKER

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THE NAUTILUS

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THE DISTRIBUTION OF THE LIMPKIN AND ITS STAPLE FOOD, POMACEA

BY FRANCIS HARPER[1]

The note by Frederick V. Hebard in the April issue of *The Oriole* concerning the Limpkin (*Aramus scolopaceus pictus*) in Charlton and Camden Counties, Georgia, brings to mind a very interesting correlation between the distribution of the bird and that of its principal food—the large fresh-water snails of the genus *Pomacea* (formerly and better known as *Ampullaria*).

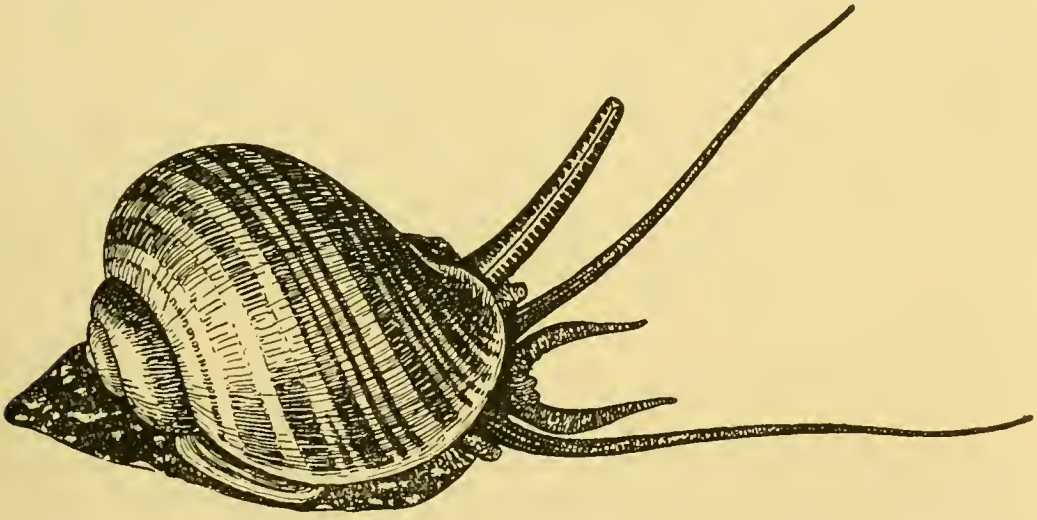

FIG. 1. *Pomacea paludosa* (Say), from Florida. Life-size drawing by Miss Helen Winchester; courtesy of *The Aquarium*.

Since the Limpkin is dependent primarily upon these snails for its existence (*cf.* Cottam, Wilson Bulletin, vol. 48, p. 11, 1936), it can not be expected to wander far, or remain long, beyond the range of *Pomacea*. Records in the literature and specimens in the Academy of Natural Sciences of Philadelphia (kindly placed at my disposal by Dr. H. A. Pilsbry and Mr. E. G. Vanatta) show that the genus *Pomacea* is widely distributed over practically the

[1] Reprinted, by permission, from *The Oriole*, vol. I, pp. 21–23, July, 1936.

entire Florida Peninsula down to the southern portion of the Everglades. It also extends northwestward to a point in Jackson County, not far from the Alabama line, and northward along the Atlantic Coast to the lower Altamaha River, Georgia. The localities are indicated on the accompanying map (figure 2). Practically all of these records pertain to the species *Pomacea paludosa* (Say) (figure 1) and its subspecies, *P. p. miamiensis* (Pilsbry), the latter extending along the coast from Palm Beach County

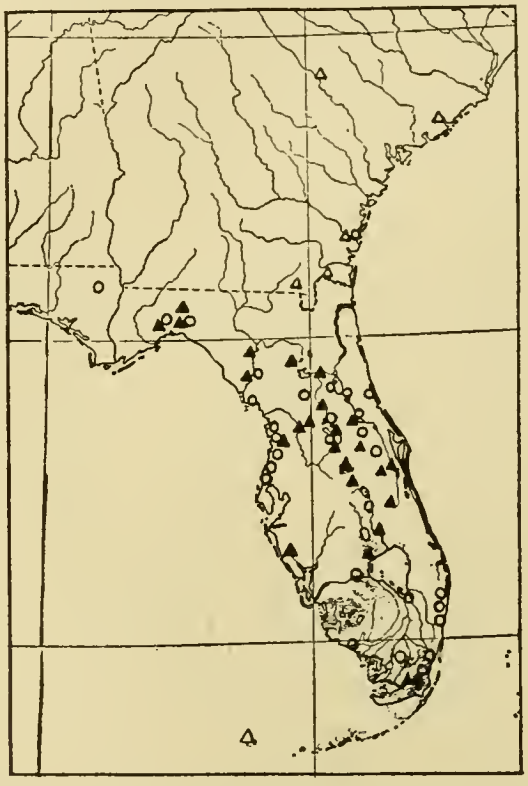

FIG. 2. Distribution of the Limpkin and of snails of the genus *Pomacea* in the Southeastern United States. Circles represent records of *Pomacea;* solid triangles, breeding localities of the Limpkin; hollow triangles, outlying records of the Limpkin.

southward. There is also a distinct species, *Pomacea pinei* (Dall), occupying an apparently restricted area along the Homosassa River in Citrus County, Florida.

Presumably the Limpkin is not connoisseur enough to discriminate between the various forms of *Pomacea.* Its breeding range in Florida, as given by Howell (Florida Bird Life, 1932, p. 200, fig. 23) and on the present map (figure 2), appears to be very nearly coextensive with the range of *Pomacea.*

A few records from outpost localities call for a little comment. The northwesternmost available record for the snails is on Spring Creek, three miles west of Marianna, Florida. Whether or not the Limpkin now occurs on Spring Creek, it very likely did so in former times (when its range and numbers were less restricted than at present), provided the snails were there in sufficient abundance. Neither the snails nor the bird seem to be known farther west toward the Mississippi Valley. Since the snails are evidently dependent on the presence of a certain amount of calcium carbonate in the soil and water, their occurrence on Spring Creek may be accounted for by a calcareous hammock belt occupying the area about Marianna (*cf.* R. M. Harper, Generalized Soil Map of Florida, Florida State Geological Survey, 1925.)

William Bartram's record (Travels, 1791, p. 49) of the Limpkin on the Altamaha in 1773 is nicely substantiated, in a way, by records of *Pomacea* from Darien and Hopeton Plantation,[2] on the lower part of that river. No recent occurrence of the Limpkin on the Altamaha seems to be known, although H. B. Bailey's statement (Bull. Nuttall Ornith. Club, vol. 7, 1883, p. 42) of its nesting in Georgia between the years 1853 and 1865 presumably refers to this part of the coastal region. Two records from South Carolina (Wayne, Birds of South Carolina, 1910, p. 35) evidently pertain to accidental wanderers beyond the range of their staple food.

My record (Auk, vol. 30, 1913, p. 493) of the Limpkin on Honey Island Prairie, Okefinokee Swamp, in May, 1912, while amply confirmed by later experience with the species in Florida, should not have led to the inclusion of the swamp as part of the Limpkin's normal range, as was done in the 1931 edition of the A. O. U. Check-List. The bird of 1912 was probably nothing more than a straggler, unable to maintain more than a very temporary existence in the Okefinokee, whose acid waters are quite unsuited to *Pomacea.* The bird could have readily reached the swamp by ascending the Suwannee River from its breeding haunts on the lower course of that stream.

[2] "Hopeton," the locality of the synonymous *Ampullaria hopetonensis* Lea, is the old name of a plantation on the south side of the Altamaha River, five miles above Darien, Georgia, a little upstream from Santo Domingo State Park.

The recent records on Mill Creek, Camden County, and vicinity are of special interest as perhaps reestablishing the Limpkin as a breeding bird of Georgia. Further investigation should be made to determine whether *Pomacea* also occurs there, and if so, in what abundance. All the available evidence indicates that the Limpkin's normal breeding range is restricted to areas where *Pomacea* is present in reasonable numbers.

A decided decrease in the numerical status of a species (such as has occurred with the Limpkin) is apt to result in its withdrawal from outlying portions of its range. This may account for the Limpkin's present apparent absence from the extreme limits of the known range of *Pomacea,* such as the Altamaha River in Georgia and Spring Creek in Florida.

According to Dr. Pilsbry, the snails may remain in water of some depth during the day but come into the shallows at the water's edge or even out of the water during the night.[3] This habit of theirs might conceivably lead to some nocturnal activity on the part of the Limpkin, in order to secure the snails more readily. Very little seems to have been published on such a phase of its life history, although Nicholson remarks (Auk, vol. 45, 1928, p. 308), "All through the nesting season their calls are heard at night everywhere over the marshes."

Additional Note.—The present form of Limpkin (*Aramus scolopaceus pictus*) occurs also in Cuba, the Isle of Pines, and Jamaica, where various species of *Pomacea* are found.

A. s. elucus inhabits Hispaniola and Puerto Rico, islands where *Pomacea* does not occur, as I am informed. According to Wetmore (Bull. 155, U. S. Nat. Mus., pp. 128–129, 1931), Sallé found Limpkins in the Dominican Republic "in heavy, humid forests where they lived principally upon mollusks." The large helices?

The following subspecies of Limpkin inhabit regions well supplied with *Pomacea* of many species, according to Dr. Pilsbry, but definite information on their food is not at hand.

A. s. dolosus, of southern Mexico and Central America.

A. s. scolopaceus, ranging from Colombia and Ecuador to the Guianas and Brazil.

A. s. carau, ranging from southern Brazil to eastern Argentina.

[3] *Pomacea* kept in aquaria deposit their eggs on the glass above the water during the night.—Ed.

HELISOMA AMMON (Gould)

BY JUNIUS HENDERSON

In The Nautilus, XLVII, 89–90, Pl. 9, fig. 4, 1934, I stated that I had seen no specimens of this species from the "Low Colorado Desert," the type locality, and quoted a letter from Dr. Pilsbry, thus: "I have been in doubt about *Pl. ammon* Gld., if the assigned locality is correct." Later that year Mrs. Henderson and I visited that region and found fossil (probably Pleistocene) specimens two miles east of south from Indio and a few immature ones near Kane Spring. I have also found in the University of Colorado Museum, catalogued as *Planorbis trivolvis* Say, fossil specimens from "seven miles south of Mecca—Yeager." I obtained from Charles C. Cass fossil specimens from Daggett, California. I found in the collection of Mr. and Mrs. E. P. Chace, fossil specimens from Indio, and fresh shells from an irrigation ditch five miles north of Lancaster, obtained by Stanley C. Field in 1930. We have fresh specimens from various stations in San Joaquin Valley and near Watsonville.

The type locality given by Gould is "Cienaga Grande, the Colorado Low Desert, T. H. Webb and W. P. Blake." He reported it also from Ocoya Creek. Blake mentions Ocoya (Ocayo) or Posey's Creek. There is a Poso Creek on one map, Posey Creek on another, north of Bakersfield. I have found nothing in the literature or on any map indicating just where Cienaga Grande is. Those more familiar with the history and geography of the region than I disclaim any knowledge of the place. The name means a big spring or big marsh. Blake mentions a Big Spring, probably the same place. Possibly it is in the area now covered by the Salton Sea, the remnant of the big lake formed by the last overflow of the Colorado River into the basin a number of years ago. The bleached shells of this and other species found in the sands of the basin, some of them very abundant, were doubtless deposited here when the basin was occupied up to the well-marked water line about the margins, by a great lake, "Ancient Blake Lake," which at its highest stage was kept fresh by overflow for a considerable period. The species reported from the basin are: *Anodonta californiensis* Lea,

Helisoma ammon (Gould), *Physa humerosa* Gould, *Amnicola longinqua* Gould, *Hydrobia protea* (Gould), *Fluminicola avernalis* Pilsbry and *F. a. carinifera* Pilsbry. This is the type locality of most of them and while the specimens scattered over the floor of the basin are fossil, several of them are elsewhere found living.

EDGAR ALLAN POE'S CONCHOLOGICAL TEXT

BY A. MYRA KEEN
Stanford University, California

In 1839 appeared a little book entitled, "The Conchologist's First Book :/ or,/ a system/ of/ Testaceous Malacology/ arranged expressly for the use of Schools,/ in which/ the animals, according to Cuvier, are given/ with the shells,/ a great number of new species added,/ and the whole brought up, as accurately as possible, to the present condition of the science./ By Edgar A. Poe/ with illustrations of two hundred and fifteen shells,/ presenting a correct type of each genus." Illustrated with miniature colored plates, it discussed the anatomy and shells of many genera of invertebrates, included a list of species for each genus (with American forms starred), and ended with a several-page glossary of a very technical sort. Of the book Sherborn says, "A piracy, based on the plates of T. Brown, Conch. Text Book, the story of which is told in International Mag., Oct. 1850."

Violation of ethics in the publication of the book would not nullify the statement, "presenting the correct type of each genus." This could make the book an important source of type-designations. Copies both of the first and second editions (1843) and of Brown (edition 4, 1836) being available in the Stanford Library, I have made a careful study of the work, with the conclusion that it can be dismissed so far as nomenclatural novelty is concerned. The "correct type" refers not to the text, where a few monospecific genera could have been construed to have types designated, but to the illustrations. The figures are not in any way tied to species-names. They illustrate genera, and are too small and unsatisfactory for specific identification.

Since copies of "Poe" and Brown are rare, a few notes may not be out of place. The story behind the publication has been worked out by J. W. Robertson: Poe was directly responsible only for the preface and for an introduction which was a neat paraphrase of Brown's. The book was really organized by Thomas Wyatt and printed by Isaac Lea, Poe's name appearing on the title-page—for a consideration—to insure a wide sale.

The text of "Poe" is distinctly not that of Brown; it is based on the system of classification used in Wyatt's own *Manual* mentioned by Poe thus, "In conclusion, the author has only to acknowledge his great indebtedness to the valuable public labors, as well as private assistance, of Mr. Isaac Lea, of Philadelphia. To Thomas Wyatt, and his late excellent *Manual of Conchology,* he is also under many obligations. No better work, perhaps, could be put into the hands of the student as a secondary text-book. Its beautiful and perfectly well-colored illustrations afford an aid in the collection of a cabinet scarcely to be met with elsewhere." The text is not an exact copy of Wyatt, however. "Poe" substitutes for Wyatt's general discussion of each genus a paragraph-description of the soft parts. This, as the title-page hints, may have been taken over from Cuvier. Descriptions of shells and the lists of species (even to typographical errors) are those of Wyatt, with occasional additions. The glossary is essentially that of Wyatt; which, in turn, is remarkably like Brown's.

A book thus compiled and intended for elementary-school use hardly seems to me important enough to be branded a piracy. As a literary curiosity it will doubtless continue to be of interest, but as a systematic treatise it can very safely be ignored.

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THE DISTRIBUTION OF MELANIA AND NERITINA IN THE BRITISH SOLOMON ISLANDS

BY W. J. EYERDAM

During 1929 and 1930 while a member of the Whitney South Sea Expedition in the British Solomon Islands I collected large series of *Melania* and *Neritina* in every river, creek, ditch, spring, and body of fresh water traversed on over four-fifths of the islands of the group. Several of the most important islands as well as smaller ones were quite thoroughly worked for freshwater shells. Some of the larger rivers on Malaita, San Cristoval and Choiseul as well as many creeks on these islands and others were collected from mouth to source.

There are several species of *Neritina* with spines that occur almost invariably in the mud at or near the mouths of streams. They like a certain amount of salt or brackish water. Most of the species in a stream occur at or near the coast. There is one species of *Neritina* that has become a land shell and is generally found in native gardens often a quarter mile from a stream. This is *N. cornea,* which is widely distributed and found also in the Philippines. There is another species which it closely resembles, *N. subsulcata,* which is generally found within a couple of feet from water, usually on steep banks.

Most of the islands are volcanic and consequently there is more erosion and action of carbonic acid than in a limestone country. The result of this condition causes most of the freshwater shells to assume a very dilapidated appearance. In some districts the shells are very much corroded and worn.

Some of the Neritinae abound in slow-running streams, some are on moist rocks above the water, while some species, like the Navicellae are found in rapids or under waterfalls. The largest species of *Neritina* are generally found near the headwaters of large streams in the mountains.

An important feature of the Neritinae is their wide dispersal. *N. macgillivrayi* Reeve and *N. petiti* Recluz alike exist in the Fiji and Solomon Islands, while *N. porcata* Gould has been found also in Samoa and Fiji as well as in the Solomons. *N. subsulcata* Sowb. and *N. cornca* L. are also found in the Philippines.

Although most of the *Neritina* and *Melania* are widely distributed in the Solomon group, still their occurrence is often under peculiar conditions.

From my journal dated August 25th I noted the following: "*Neritina* and *Melania* at Kieta, Bougainville Island. It is remarkable what great variation there is in number of species of freshwater shells, chiefly melanians that occur around Kieta, within a distance of less than one mile. There are four small creeks or ditches within this area, each of which has species not found in any of the others, although most of them are found in other parts of the islands. In the first creek on the Kieta side of the brackish water river, which is near the German missionary's coconut plantation, were found two species *Melania* and two species of *Neritina*. None of these were found in any of the other three creeks which are more or less brackish except at their sources. This first creek falls in a succession of rills in the forest, but flows freely only after a heavy rain. In the next creek (brackish water) which is between Tom Ebery's store and the Chinese village, about a dozen species of *Melania* and *Neritina* and two species of two other genera were taken. Two species in this creek do not occur in the three others. The third creek or ditch, about 200 yards from Tom Ebery's store toward the hospital, yielded about a dozen species. Two species occurred that were not found elsewhere. The fourth small creek which is merely a ditch is only 100 yards beyond the third one. Twelve species of *Melania* and *Neritina* were taken of which four species did not occur in any of the other creeks.

"The Melanians are mostly buried in the soft mud while the Neritinas cling to stones. In the fourth creek is a genus represented by one species that was not found elsewhere."

About one mile from Faisi in the Shortland Islands on Low Fung's plantation there is a very remarkable freshwater spring of clear cold water. The pool is about twelve feet deep and about

thirty feet across. It comes fresh out of the ground and is not more than 100 yards behind a mangrove swamp on level ground in the jungle. In this spring at least twenty-eight species of freshwater snails were collected in two hours. With thorough collecting it is possible that the spring would perhaps yield a dozen more species of shells. Many of the species taken from the spring were not found elsewhere and seem to be highly localized while others have a wide distribution.

THE GASTROPOD FAUNA OF THE INTERTIDAL ZONE AT MOSS BEACH, SAN MATEO COUNTY, CALIFORNIA

BY H. E. VOKES
University of California, Berkeley

The gastropod fauna here listed was collected during a five weeks' period involving the latter part of the month of June and the month of July, 1933. A total of 126 species are represented in the collection, 21 of which are reported from beyond the previously known range of the species.

The intertidal zone at Moss Beach, consists of a series of truncated strata of fine grained, black, sandstones of Pliocene age, striking at an angle from the shore, so that at low tide an area almost 300 feet wide is exposed on which are developed a large number of tide pools protected from the action of the waves by the edges of the strata which dip toward the sea. The region from which the collections were made lies southward from the town of Moss Beach to Pillar Point, a distance of approximately three miles. Pillar Point marks the northern limit of Halfmoon Bay, a down-faulted block which being low lying, has a sandy bottom and supports an entirely different faunal assemblage from that found at Moss Beach.

In the following check-list species represented in the collection which occur only at Pillar Point and probably have been washed up by wave action from the sands of Halfmoon Bay are indicated by a dagger (†) and the forms represented in the collections from all points by empty shells only are indicated by an asterisk (*). The gastropod species found are:

Haminoea vesicula (Gould), 1855
Gadinia reticulata (Sowerby), 1835
Arctonchis borealis (Dall), 1871
Conus californicus Hinds, 1844
†**Clathrodrillia* (*Moniliopsis*) *incisa* (Carpenter), 1865
†**Clathrodrillia* (*Moniliopsis*) *incisa* var. *ophioderma* (Dall), 1908
†**Pseudomelatoma torosa* (Carpenter), 1865
Mangelia (*Bela*) *variegata* Carpenter, 1864
†**Olivella biplicata* Sowerby, 1825
Cypraeolina pyriformis (Carpenter), 1865
†**Mitra idae* Melvill, 1893
Searlesia dira (Reeve), 1846
†**Nassarius* (*Schizopyga*) *fossatus* (Gould), 1843
Nassarius (*Schizopyga*) *cooperi* (Forbes), 1850
Mitrella carinata (Hinds), 1844
Mitrella carinata var. *gausapata* (Gould), 1851
Mitrella gouldii (Carpenter), 1857
Mitrella tuberosa (Carpenter), 1864
Amphissa columbiana Dall, 1916
Amphissa versicolor, 1871
Amphissa bicolor Dall, 1892
Purpura foliata Martyn, 1784
Tritonalia lurida (Middendorff), 1849
Tritonalia lurida var. *aspera* (Baird), 1863
Tritonalia lurida var. *munda* (Carpenter), 1864
Tritonalia lurida var. *rotunda* Dall, 1919
**Tritonalia painei* Dall, 1903
Tritonalia circumtexta (Stearns), 1871
Tritonalia interfossa (Carpenter), 1864
Tritonalia interfossa var. *atropurpurea* (Carpenter MS) Dall, 1919
Tritonalia foveolata (Hinds), 1843
**Tritonalia subangulata* (Stearns), 1873
Thais (*Nucella*) *lamellosa* (Gmelin), 1792
Thais (*Nucella*) *lima* (Martyn), 1784
Thais (*Nucella*) *canaliculata* (Duclos), 1832
Thais (*Nucella*) *emarginata* (Deshayes), 1839
Thais (*Nucella*) *emarginata* var. *ostrina* (Gould), 1852
Acanthina (*Acanthinucella*) *spirata* (Blainville), 1832
**Epitonium* (*Opalia*) *wroblewskii* (Morch), 1876
Epitonium (*Nitidiscala*) *crebricostatum* (Carpenter), 1866
Epitonium (*Nitidiscala*) *indianorum* (Carpenter), 1865
Epitonium (*Nitidiscala*) *tinctum* (Carpenter), 1865
**Turbonilla* sp. indet.
Odostomia (*Chrysallida*) *astricta* Dall and Bartsch, 1907

Odostomia (*Chrysallida*) *oregonensis* Dall and Bartsch, 1907
Odostomia (*Chrysallida*) n. sp.
Odostomia (*Iolaea*) *amianta* Dall and Bartsch, 1907
Odostomia (*Evalea*) *tenuisculpta* Carpenter, 1864
Odostomia (*Evalea*) *valdezi* Dall and Bartsch, 1907
Odostomia (*Evalea*) sp. cf. *io* Dall and Bartsch, 1903
Odostomia (*Evalea*) n. sp.
Odostomia (*Amaura*) *moratora* Dall and Bartsch, 1909
**Trivia californiana* (Gray), 1828
Erato vitellina Hinds, 1844
Cerithiopsis (*Cerithiopsidella*) *cosmia* Bartsch, 1907
Bittium (*Stylidium*) *eschrictii* (Middendorff) var. *monterey-ense* Bartsch, 1907
Bivonia compacta Carpenter, 1864
Spiroglyphus lituellus (Morch), 1861
Littorina planaxis Nuttall in Philippi, 1847
Littorina (*Melarhaphe*) *scutulata* Gould, 1849
Lacuna porrecta Carpenter, 1864
Lacuna solidula Loven var. *carinata* Gould, 1846
Lacuna variegata Carpenter, 1864
Lacuna marmorata Dall, 1919
**Iselica fenestrata* (Carpenter), 1864
Diala acuta Carpenter, 1864
Barleeia haliotiphila Carpenter, 1864
Barleeia oldroydi Bartsch, 1920
Cingula montereyensis Bartsch, 1912
Cingula californica Tryon, 1865
Alvania compacta Carpenter, 1865
Alvania n. sp. A
Alvania n. sp. B
Hipponyx serratus Carpenter, 1857
Hipponyx antiquatus (Linnaeus), 1767
Crepidula convex Say, 1822
Crepidula adunca Sowerby, 1825
Crepidula exuviata Nuttall, 1859
Crepidula nivea C. B. Adams, 1852
Crepidula (*Crepipatella*) *lingulata* Gould, 1846
†**Polinices* (*Euspira*) *lewisi* (Gould), 1847
†**Polinices* (*Euspira*) *draconis* Dall, 1903
Lamellaria rhombica Dall, 1871
Velutina laevigata (Linnaeus), 1767
Acmaea mitra Eschscholtz, 1833
Acmaea pelta Eschscholtz, 1833
Acmaea scutum Eschscholtz, 1833
Acmaea ochracea Dall, 1871
Acmaea digitalis Eschscholtz, 1833

Acmaea limatula Carpenter, 1866
Acmaea scabra (Gould), 1846
Acmaea persona Eschscholtz, 1833
Acmaea instabilis Gould, 1846
Acmaea incessa (Hinds), 1842
Acmaea asmi (Middendorff), 1849
Acmaea palacea Gould, 1851
Acmaea cribraria (Gould MS) Carpenter, 1834
Lottia gigantea Gray, 1834
Tricolia compta (Gould), 1855
Tricolia pulloides (Carpenter), 1865
**Astraea* (*Pachypoma*) *inaequalis* (Martyn), 1784
Homalopoma carpenteri (Pilsbry), 1888
Homalopoma bacula (Carpenter), 1864
Tegula (*Chlorostoma*) *funebralis* (A. Adams), 1854
Tegula (*Chlorostoma*) *brunnea* (Philippi), 1848
Tegula (*Chlorostoma*) *montereyi* (Keiner), 1850
**Tegula* (*Promartynia*) *pulligo* (Martyn), 1784
**Tegula* (*Omphalius*) *ligulata* (Menke), 1850
Calliostoma costatum (Martyn), 1784
Calliostoma costatum var. *caeruleum* Dall, 1919
Calliostoma costatum var. *pictum* Dall, 1919
Calliostoma canaliculatum (Martyn), 1784
†**Calliostoma tricolor* Gabb, 1865
Margarites (*Pupillaria*) *pupillus* (Gould), 1849
Margarites (*Pupillaria*) *salmonea* Carpenter, 1864
Margarites (*Lirularia*) *lirulatus* (Carpenter), 1864
Margarites (*Lirularia*) *succincta* (Carpenter), 1864
**Haliotis cracherodii* Leach, 1817
Haliotis rufescens Swainson, 1822
Megatebennus bimaculatus (Dall), 1871
Megatebennus sp.
Diadora aspera (Escholtz), 1833

The occurrence at Moss Beach of several of these species is beyond their previously reported range. The majority of these forms have not heretofore been reported north of the vicinity of Monterey, California; those species in the following list indicated with an asterisk not being reported outside of Monterey Bay in the past. Included in the species for which the Moss Beach occurrence represents a new northern limit are:

Pseudomelatoma torosa (Carpenter), 1865
Mangelia (Bela) variegata Carpenter, 1864
Tritonalia foveolata (Hinds), 1834

Tritonalia subangulata (Stearns), 1873
Epitonium (*Nitidiscala*) *tinctum* (Carpenter), 1865
**Odostomia* (*Chrysallida*) *astricta* Dall and Bartsch, 1907
Odostomia (*Iolaea*) *amianta* Dall and Bartsch, 1907
**Odostomia* (*Evalea*) *valdezi* Dall and Bartsch, 1907
Cerithiopsis (*Cerithiopsidella*), *cosmia* Bartsch, 1907
Diala acuta Carpenter, 1864
**Cingula montereyensis* Bartsch, 1912
Hipponix serratus Carpenter, 1857
**Acmaea ochracea* Dall, 1871
Tricolia compta (Gould), 1855
Tricolia pulloides (Carpenter), 1865
Tegula (*Omphalius*) *ligulata* (Menke), 1850
Calliostoma tricolor Gabb, 1865
**Margarites* (*Pupillaria*) *salmonea* Carpenter, 1864

In so far as the writer is aware, the presence of *Crepidula convexa* Say in the collections from Moss Beach, represents the first record of the occurrence of this species in the waters of the Pacific Ocean proper, though it has been part of the fauna of San Francisco Bay for some time. The migration of this species will be commented upon in a forthcoming paper.

New southern limits are indicated for the range of two species. Of these, *Odostomia* (*Amaura*) *moratora* Dall and Bartsch, 1909, has not been reported from any locality other than at Point Reyes, from where it was described; and *Alvana compta* Carpenter, 1865, has not been collected south of Trinidad, California.

The number of species reported beyond their previously known range is not remarkable when one considers the fact that the great majority of studies of the California molluscan faunas have been made at a very few localities. San Diego, San Pedro, Santa Barbara, Monterey, and to a lesser extent Newport, Catalina Island, Farallones, Bodega Bay, Fort Bragg and Trinidad represent the areas from which nearly all our collections have been made, and the faunas of the intervening areas are as yet practically unknown.

A REDUCTION OF *CYPREA ANNAE* ROBERTS AND *CYPREA POLITA* ROBERTS TO SYNONOMY WITH *CYPREA SEMIPLOTA* MIGHELS

WILLIAM M. INGRAM
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Having examined over one hundred specimens and collected the three forms, *Cyprea polita* Roberts,[1] *Cyprea annae* Roberts,[2] and *Cyprea semiplota* Mighels,[3] I have come to the conclusion that the characteristics used by Roberts to separate *Cyprea annae* and *Cyprea polita* from Mighel's *Cyprea semiplota* are not justifiable specific distinctions. In my opinion, Roberts's two species should be placed in synonymy with *Cyprea semiplota* Mighels.

The characteristics described by Roberts as specific distinctions appear to be individual variations. The intergradation from one of his species to the other is so fine that in borderline cases it is extremely difficult to classify the specimen. In describing *Cyprea annae,* he lists as qualities separating it from the other two species a broad flattened shape, rather more solid, and of a greyish-white color. But these characteristics appear in varying degrees of intergradation in all three forms. *Cyprea annae* Roberts is not actually a flattened form; in extreme cases the broadness of the shell might lead one to believe so, but by comparing examples of the other two species of proportional size, it will be noted that the dorsal surface has the same identical curvature. Taking into consideration the difficulty of determining how thick the shell should be before it is to be classified as Roberts's *Cyprea annae,* I believe that this characteristic is invalid in specific separation. Too, the greyish-white color is the intermediate shade of all three forms, although it grades into orange-yellow or light brown in *Cyprea polita* Roberts, and reaches a medium brown or even a blackish-brown in *Cyprea semiplota* Mighels.

The description by Roberts of *Cyprea polita* mentions such characteristics as the creamy-white color of the shell, thickly covered with minute white spots, pittings orange, particularly

[1] *Am. Jour. Conch.,* iv, p. 70, pl. 15, f. 1–3; 1868.
[2] *Ibid.,* p. 250, pl. 15, f. 4–6.
[3] Proc. Bost. Soc., ii, p. 24; 1848.

those on the extremities, base ivory-white, teeth confined to the aperture except for a short distance from each end. However, the white sports are quite characteristic of the other two forms also, although the arrangement and number of spots are variable. The description that Roberts gives of the arrangement of the teeth in *Cyprea polita* is also true of *Cyprea annae* and *Cyprea semiplota* Mighels: in all three forms they are confined to the aperture except at the extreme anterior and posterior ends, where they extend up the columella side of the base, nearly reaching the lateral margins of the shell. The base is also ivory-white or bordering on the tumid in three forms.

Additional characteristics mentioned by Mighels in describing *Cyprea semiplota* are also typical of the other two forms. These are a narrow aperture that is yellowish, and a shell that is light brown in color. According to my observations the aperture is equally narrow in the three species under discussion, and is tinged with yellow or orange. The light brown is one shade in the variable color of these forms.

The lack of notable structural difference, and the fine intergradations in structural proportions as a result of individual variation, call, in my opinion, for the reduction to synonomy of two of the specific names. Because of Mighels's priority of classification, *Cyprea polita* Roberts and *Cyprea annae* Roberts are accordingly placed in synonomy with *Cyprea semiplota* Mighels.

Cyprea semiplota Mighels

Shell pear-shaped, color creamy-orange to blackish-brown, dorsal surface sprinkled with minute white spots; columella side of the aperture angled, sometimes heavy; teeth on the columella side confined to the aperture except at the anterior and posterior extremities, where they extend over the base toward the lateral surfaces of the shell, teeth and aperture tinged with orange-yellow or brown, interstices between the teeth wide; narrow aperture, curved posteriorly; base ivory-white or tumid.

Cyprea semiplota Mighels is one of five endemic species occurring in the Hawaiian Archipelago; the others are *Cyprea tesellata* Swainson, *Cyprea sulcidentata* Gray, *Cyprae madagascariensis* Gmelin, and *Cyprae ostergaardi* Dall.

A NEW SUBSPECIES OF PAPUINA WITH RECORDS OF LAND MOLLUSKS FROM EASTERN PAPUA AND ASSOCIATED ISLANDS

BY WILLIAM J. CLENCH

A small collection, recently received from the eastern part of New Guinea and coastal islands, contains a new subspecies of *Papuina* as well as other land mollusks that appear to be worthy of record. One of the most noteworthy is that of *Partula similaris* Hartmann from *Iburai,* East Cape. This is the first definite record for the mainland of New Guinea. *Partula grisea* and *P. bulimoides,* both described by Lesson from New Guinea, still remain unknown and accordingly to Hedley and others (Man. of Conch. (2), **20**, p. 304, 1909) are questionably Papuan. *P. occidentalis* Hedley was described as coming from Samarai Island, and *P. similaris* has heretofore been known only from Woodlark Island.

The following are the detailed locations from where the shells were collected. In the subjoined list of species only localities not listed in a previous report from this same region are given (Nautilus **49**, pp. 88–91, 1936).

Salamo, at head of small bay, S. E. Fergusson Island, D'Entrecasteaux Islands.

Omarakana, North central part of Kiriwina Id., Trobriand Islands.

Kaileuna, small island west of Kiriwina Id., Trobriand Islands.

Vakuta, small island south of Kiriwina Id., Trobriand Island.

Iburai, 10 miles west of East Cape, Eastern Division, Papua.

Huhuna, 20 miles west of East Cape, Eastern Division, Papua.

Papuina rollsiana Smith, Salamo.

" *albocarinata* Smith, Vakuta; Kaileuna.

" *trobriandensis* Hedley, Vakuta; Kaileuna.

" *williamsi* Clench & Archer, Omarakana.

" *williamsi atalanta* Clench, Omarakana.

" *brumeriensis* Forbes, Huhuna.

Chloritis delphax 'Dohrn' Kobelt, Huhuna.

" *rehsei* v. Mts., N.W. Fergusson Island.

Partula similaris Hartman, Iburai.

Leptopoma vitreum Lesson, Salamo.
Palaeohelicina stanleyi sinus Hedley, Iburai.

Papuina williamsi atalanta new subspecies

This subspecies is similar in all of its general characters to *P. williamsi* Clench and Archer (Naut. **49**, p. 88, 1936) differing only in its method of coloration. The ground color is similar, but this subspecies possesses a series of spiral bands of chocolate brown varying from 4 to 10 in number. These occur both above and below the periphery, the peripheral area being the widest portion between any of the bands. There is a tendency of the bands coalescing on a few of the shells, particularly on the early whorls.

Height 19; Width 25; Aperture 10.8 × 10 mm. Holotype.

Holotype.—Mus. Comp. Zoöl. 111151, Omarakana, north central Kiriwina Id., Trobriand Islands. H. Williams collector, 1936.

Remarks.—This new form bears the same relationship to *P. williamsi* as *P. trobriandensis* does to *P. albocarinata,* the former in each case being a banded race of the latter.

THREE NEW SECTIONS AND RECIFICATIONS OF SOME SPECIFIC NAMES IN THE PECTINIDAE

BY LEO GEORGE HERTLEIN

(Concluded from p. 27)

Pecten (Chlamys) prototranquebaricus var. noetlingi, new name

Pecten (Chlamys) prototranquebaricus Vredenburg var. *paucicostatus* Vredenburg, Mem. Geol. Survey India, Vol. 50, pt. 2, 1928, p. 433, pl. 15, fig. 14. "Gwadar, Baluchistan, Mekran series (Gwadar stage)." Miocene.

Not *Pecten paucicostatus* Carpenter, Rept. British Assoc. Adv. Sci. for 1863 [issued 1864], p. 645.—See Arnold, U. S. Geol. Survey, Prof. Paper 47, 1906, p. 137, pl. 39, figs. 3, 3a, and 4. "The type is labelled 'Santa Barbara' by Jewett, but is unquestionably from the Gulf of California, as no species with its characteristics is known outside the tropical fauna. Besides, Jewett was known to be quite careless regarding the localities of his

specimens." [=*P. tumbezensis* d'Orbigny, Voy. dans Amér. Mérid., Vol. 5, 1846, p. 663. Tumbez, Peru. A new name for *P. aspersus* Sowerby, not *P. aspersus* Lamarck].

The earlier use of *Pecten paucicostatus* by Carpenter makes it necessary to rename the variety described by Vredenburg. It can take the name *noetlingi.*

PECTEN (CHLAMYS) VREDENBURGI, new name

Pecten middlemissi Das-Gupta, Journ. & Proc. Asiatic Soc. Bengal, New Ser., Vol. 19, no. 4, 1923 [issued July, 1924], p. 84, pl. 11, figs. 9, 9a, 10, 11, 11a, 12. Hathab, Bhavanagar State (Kathiawar). India. Tertiary.

Not *Pecten* (*Chlamys*) *middlemissii* Diener, Mem. Geol. Survey India, Palaeontologia Indica, New Ser., Vol. 5, Mem. no. 1, 1913, p. 111, pl. 13, fig. 20. *Myophoria* limestone. Pastannah. Kashmir. Upper Triassic.

The combination, *Pecten middlemissi,* has been used by Diener, and the species described by Das-Gupta can take the name *vredenburgi.*

PECTEN (CHLAMYS) TAUROPERSTRIATA var. DAS-GUPTAI, new name

Chlamys tauroperstriata Sacco var. *spinosa* Das-Gupta, Journ. & Proc. Asiatic Soc. Bengal, New Ser., Vol. 19, no. 4, 1923 [issued July, 1924], p. 82, pl. 11, figs. 5, 6, 6a, 7, 7a. Hathab, Bhavanagar State (Kathiawar). India. Tertiary.

Not *Pecten spinosus* Brown, Illustrated Conch. Great Britain and Ireland, 1827, p. 73, pl. 24, fig. 8. [=*Pecten* (*Chlamys*) *multistriatus* Poli, according to Bucquoy, Dautzenberg and Dollfuss, Moll. Marine Rousillon, Vol. 2, fasc. 3, 1889, p. 104, pl. 16, figs. 1, 2, 3, 4, 5. Mediterranean and Atlantic Ocean to Canary Islands, etc.]

Due to the earlier use of *Pecten spinosus* by Brown, the form described as *spinosa* by Das-Gupta can take the name *das-guptai.*

PECTEN MÖRICKEI, new name

Pecten tenuicostatus Hupé, Hist. Fis. y Pol. de Chile, Zool., Vol. 8, 1854, p. 291, Atlas Coq. pl. 5, fig. 4. "Habita fosil en los faluns de Chiloe."—Möricke, Neues Jahrb. f. Min. Geol. und Palaeo., Beil. Bd. 10, 1895–1896, p. 580, pl. 12, figs. 13, 14, 15, 16. "Tubul (Philippi)." Chile. Tertiary.

Not *Pecten tenuicostatus* Mighels & Adams, Proc. Boston Soc. Nat. Hist., Vol. 4, 1841 [1844 on title page but pp. 1–54 were

issued in 1841 according to Meisel], p. 49. "*Habitat,* Casco Bay."—Boston Journ. Nat. Hist., Vol. 4, no. 1, Jan., 1842, p. 41, pl. 4, fig. 7. [=*Pecten grandis* Solander, Portland Cat., 1786, p. 50. See Dall, Nautilus, Vol. 34, no. 3, 1921, p. 99. *Pecten magellanicus* Gmelin is a synonym according to Dall, Nautilus, Vol. 38, no. 4, 1925, p. 112.]

The name *tenuicostatus* was proposed as a specific name for a pecten by Mighels & Adams much earlier than by Hupé. The name *mörickei* is here proposed for the species from Chile described by Hupé.

Pecten cambodicus, new name

Pecten fimbriatus Mansuy, Mem. Serv. Geol. Indochine, Vol. 1, fasc. 2, 1912, p. 129, pl. 24, figs. 4a, 4b. Yun-nan, Indo-China. Triassic.

Not *Pecten fimbriatus* Philippi, Enum. Moll. Siciliae, Vol. 2, 1844, p. 61, pl. 16, fig. 6. Sicily. Fossil. Not *Pecten fimbriatus* Moore, Quart. Journ. Geol. Soc., Vol. 26, 1870, p. 248, pl. 11, fig. 8. "Wollumbilla." Australia. [=*Pecten moorei* Etheridge, Geol. and Paleo. Queensland and New Guinea, 1892, p. 445, pl. 21, fig. 20. "Wollumbilla." Rolling Downs Formation. Lower Cretaceous.]

Pecten fimbriatus has been used by both Philippi and Moore. The species for which Mansuy use the same combination of names can be replaced by *Pecten cambodicus.*

Pecten (Chlamys) oweni Gregorio

Pecten pictus Sowerby, Thes. Conch., Vol. 1, 1842, *Pecten,* p. 62, pl. 20, fig. 233. "Isle of Baicus. Mr. Cuming." [The date on the title page is given as 1847, but according to Sherborn, this part was issued prior to November, 1842.]—Sowerby, Proc. Zool. Soc. London, 1842, p. 163. "*Hab.* Ins. Baiae. Ins. Negros, Philippinarum."—Reeve, Conch. Icon., Vol. 8, 1853, *Pecten,* sp. 116, pl. 28, fig. 116. "Isle of Baicus. Mr. Cuming."—Faustino, Philippine Bureau Sci., Mon. 25, 1928, p. 31. "Negros." Philippine Islands.

Not *Pecten pictus* Goldfuss, Petrefactae Germaniae, Bd. 2, 1834–1840 [this part issued 1833, according to Sherborn], p. 67, Taf. 97, figs. 4a, b, c. "Findet sich in den obersten tertiären Schichten am Mittelrhein." Oligocene.

Not *Pecten pictus* Da Costa, Brit. Conch., 1778, p. 144, pl. 9, figs. 1, 2, 4, 5. Great Britain and Ireland. [=*Pecten opercu-*

laris Linnaeus, Syst. Nat., Ed. 10, 1758, p. 698. "Habitat in O. meridionali."]

Not *Pecten pictus* Deshayes in Laborde, Voy. Arab. Pétrée, 1830, p. 66. [=*P. sanguinolentus* Gmelin, according to Tomlin and Salisbury, Proc. Malacol. Soc. London, Vol. 18, pt. 1, 1928, p. 33.]

Pecten oweni Gregorio, Naturalista Siciliano, Anno Terzo, no. 5, 1883–1884, p. 133. A new name for *Pecten pictus* Sowerby, not *Pecten pictus* Goldfuss.

Not *Pecten* (*Patinopecten*) *oweni* Arnold, U. S. Geol. Survey, Prof. Paper no. 47, 1906, p. 63, pl. 8, figs. 1a and 1b. "Foxin's Ranch, Santa Barbara County," California. Pliocene. [=*Pecten* (*Patinopecten*) *lohri* Hertlein, NAUTILUS, Vol. 41, no. 3, 1928, p. 93. A new name for *Pecten oweni* Arnold, not *Pecten oweni* Gregorio.]

The species described as *Pecten pictus* by Sowerby was renamed *Pecten oweni* by Gregorio due to the earlier use of the same name by Goldfuss and others. Since Gregorio's correction has not been generally noticed, it is placed here so as to call attention to the nomeclature of the species.

PECTEN (PECTEN) VENTONENSIS Cooke

Pecten ventonensis Cooke, Carnegie Inst. Washington, Publ. 291, 1919, p. 130, pl. 12, figs. 1a, 1b. "One-half mile inland from the pier of the Juraguá Railroad, Santiago Bay," Cuba. "Oligocene."

Pecten (*Pecten*) *barretti* Woodring, Carnegie Inst. Washington Publ. 366, May, 1925, p. 62, pl. 7, figs. 6 and 7. Bowden, Jamaica. Middle Miocene.—Woodring, Carnegie Inst. Washington, Publ. 385, 1928, pp. 19, 61.

Not *Pecten barretti* Seeley, Ann. & Mag. Nat. Hist., Ser. 3, Vol. 7, 1861, p. 118, pl. 6, fig. 1. Upper Greensand near Cambridge, England. Cretaceous. [This falls in the synonymy of *Pecten* (*Chlamys*) *robinaldinus* d'Orbigny, according to Woods, Palaeontogr. Soc., Vol. 56 [Cret. Lamell., Vol. 1, pt. 4], 1902, p. 181.]

Woodring has already suggested that the species described by him as *Pecten barretti* may fall in the synonymy of *Pecten ventonensis* Cooke. This observation appears to be correct, in which case, a new name will not be necessary for the Jamaican species. Seeley had already used the name *Pecten barretti* for a Cretaceous species.

PECTEN PHOENICIENSIS, new name

Pecten irregularis Blanckenhorn, Palaeontogr., Bd. 81 Abt. A, Lief. 4–6, 1934, p. 187, fig. 19. Syria: Cretaceous. Not *Pecten irregularis* Sowerby, Thes. Conch., Vol. 1, 1842 [date according to Sherborn], p. 69, pl. 13, figs. 51, 52. Recent. Not *Pecten irregularis* M'Coy, in Griffith's Syn. Carb. Lst. Foss. Ireland, 1844, p. 95, pl. 15, fig. 8. Ireland: Carboniferous.

The combination of names, *Pecten irregularis,* has been used by Sowerby and by M'Coy. The specific name *phoeniciensis* is proposed for the species described by Blanckenhorn.

PECTEN MANDANNAENSIS, new name

Pecten (*Variamussium*) *yukonense* Lees, Trans. Roy. Canadian Inst., Vol. 20, pt. 1, no. 43, Sept., 1934, p. 38, pl. 3, fig. 3. Mandanna Valley. Lewes River series. Laberge area. Yukon. Noric, Triassic.

Not *Pecten* (*Entolium*) *yukonensis* Smith, U. S. Geol. Surv., Prof. Paper 141, 1927, p. 122, pl. 101, figs. 9 and 10. South bank of Yukon River opposite Nation River, Alaska. Karnic, upper Triassic.

The name proposed by Lee is untenable according to the International Rules of Nomenclature. The name *mandannaensis* is here proposed for the species described by Lee.

PECTEN NOTOSYRIACUS, new name

Pecten syriacus Blanckenhorn, Denkschr. kais. Akad. Wissensch. Wien. Math-Naturwiss. Cl., Bd. 57, 1890, p. 611. Im obersten Miocänkalk von Fadikije auf dem Djebel el-Koseir, im Brecciënkalk bei Kefr Maz südlich Katma an der Strasse nach Aleppo. Syria.—Blanckenhorn, Sitz. Phys.-Med. Soc. Erlangen, Heft 24, 1892, p. 26, pl. 2, figs. 3a, 3b. Not Janira [=*Pecten*] *syriaca* Conrad, in Lynch, Official Rept. U. S. Exped. to explore the Dead Sea and the River Jordan, Ap., 1852, p. 230, pl. 1, fig. 6 [two figs.]. "Local.: 'Abeih." Cretaceous. Not *Chlamys* (*Aequipecten*) *syriacus* Cossmann, in Douville, Bull. Soc. Geol. Franc., Ser. 4, Vol. 25, 1925, p. 325, pl. 8, figs. 7a, 7b, 7c. "Darb-el-Cheikh." Maghara. Northern Sinai. Callovian, Jurassic.

The combination of names used by Conrad makes Blanckenhorn's use of *Pecten syriacus* untenable. The specific name *notosyriacus* is here proposed for the Tertiary species described by Blanckenhorn.

BRYANT WALKER 1856–1936

Running through the first volume of the American Naturalist, March, 1867, to February, 1868, was a series of articles by E. S. Morse on "The Land Snails of New England." One of the numbers of this first volume came to the hands of Edward Carey Walker, a lawyer of Detroit. He mailed it to his eleven-year old son, Bryant, who had been sent to a farm near Ypsilanti, twenty miles away, for his summer vacation. Young Bryant Walker had collected butterflies. He had climbed for birds' eggs as many boys of that time did. It was a belief of his that he was the first to observe the advent of the English sparrow in eastern Michigan. He saw the bird feeding among chickens in a yard of the suburban Springwells and collected it by means of a top-heavy, muzzle-loading shotgun, with maybe some of the chickens. The Morse paper on snails fixed with sharp definiteness an interest in natural history that hitherto had been without direction. With some slight waning during the early struggles for a livelihood and in the period of courtship, the interest flamed high until well along in Bryant Walker's last illness when eyesight and attentiveness both weakened. The span of years between Morse's chance begetting of a student of mollusks and the final sick bed was very nearly seventy.

Edward Walker was among the emigrants of the great folk-wandering out of the eastern states to Michigan, then virtually the inhabitable frontier. Like the mass of those emigrants he was from rural New York, and that meant that he, together with the others, was only a generation out of New England. Through his mother, Bryant Walker was related to William Cullen Bryant. The family in Detroit was Presbyterian in religious affiliation. But either on one side or the other, there was some former connection with the Society of Friends. In this, Mr. Walker appeared to take rather more than the usual pride in such history or tradition. The fact is curious. For although he had the full measure of the Quaker's virtue of modesty, he had—the same as the Quaker-born Isaac Lea—no whit of that meekness which is the Quaker's rule of life. In a folder that was found on his desk was copy of correspondence with a person who, he thought, was retaining borrowed specimens unduly. "I insist," he wrote,

"upon the immediate return of the shells (all of them), whether you are through with them or not. This is peremptory and final."

Mr. Walker was graduated from the University of Michigan in 1876 with the degree of B.A. It was the year of his first conchological paper. It was written in collaboration with C. E. Beecher who was to become a professor of paleontology at Yale University and pre-decease his friend by 32 years. The slim little paper listed the shells in the vicinity of Ann Arbor. Not until 1879 did Mr. Walker venture upon a second effort. This was the year of his graduation from the law school of his university and twelve months after he had been licensed to practise law. Yet conchological work was still going on if this is to be interpreted from the secretaryship and then the presidency of the Detroit Scientific Association, lasting from 1877 to some time after 1884. In my hearing, the organization was never mentioned. Word of it came from same casual reading of local history. All that was said of it was that it had bought one of the Ward collections of rocks and was having exceeding trouble in maintaining a home for the possession.

Actual law practise began in partnership with the father, but it was not made easy by that. The country was passing out of the financial blight of the 1870s. Detroit was poor, and competition at the bar intensive. There were hard and discouraging days. A friend recalled at the time of Mr. Walker's death that one of the latter's tasks had been to serve papers on passing schoonermen who, to escape levy for debt, would sail as close to the Canadian shore of the Detroit River as they could. It fell to the young lawyer to learn the precise line of the international border, to row a boat with daring, to dodge the missiles of sailors and be deaf to their descriptive comment. The period of probation appears, however, to have been short. Fair living came as the economic situation bettered. There was a marriage that was to end tragically in scarcely a year by the death of the wife. Two effects followed, an intensification of natural reserve as to matters relating to himself and a concentration upon the interest in shells.

The home that Mr. Walker occupied for the greater part of his life was a three-storied, high-ceilinged, mansard-roofed house of a

type that flourished in Detroit in its simpler days and which now is nearly a symbol of the slums. The attic was used as a study during the early years. At best, it could hardly have been comfortable. Then a small, two-floored museum was built at the back of the house, its windows looking out on a garden that strangely remained a halting place for migrating birds long after the district had ceased to be suburban even remotely. Toward the close of the World War, the museum was doubled in size. The ground floor was devoted to gastropods, the upper to bivalves. When the collection was moved in June to the University of Michigan at Ann Arbor, a great pile of boxed shells was discovered in the attic rooms, others on shelves in the basement where some were partly buried under coal. Shells were in closets, on the tops of the forty-two cases and in an entry-way which the household still spoke of as the wood-shed.

The great allowance of space largely accounts for Mr. Walker's readiness to accumulate specimens. How many collections he bought in entirety there is no precise way of learning. The catalogues merely list the sources of the material and say nothing as to the ways by which it was acquired. Of the purchases, the proprietor was inclined to speak vaguely or to depreciate, and he once told the writer that the collection, kept to land and fresh-water shells, was in fact built up mostly by exchanges and the small percentages that were taken as remuneration for identifications.

Examination of the catalogues has proven to be highly interesting. The first was made in the back part of a university notebook on physics, the date of which, 1874, can just barely be made out. Therein are 6635 entries. The beginning is with "Z. nitida, Great Britain," and the Ypsilanti shells, which actually were obtained first, follow scatteringly. There were experiments thereafter with a number of forms of catalogues until, finally, all the items were laboriously copied into specially printed blank books and cross-indexed with cards. These cards were small, and must have supplied insufficient data. Yet Mr. Walker clung to them. Experiment was over so far as they were concerned. Conservatism of the same kind involved microscopes. Five handsome and costly instruments turned up here and there among his effects.

Yet the microscope he most frequently used was a feeble, awkward, and imperfect mechanism that the college student of today would think unworthy of his mishandling. It was with the crazy Viennese apparatus that, for one thing, he studied the surface sculpture of *Somatogyrus*. A little apologetically he said that he knew its bad habits whereas the newer instruments raised in his mind the suspicion that they were doing better than they should. The conservatism had its limitations. It did not extend to the ever-changing scientific nomenclature or cause him to accept the International Code as inspired of heaven.

In all, Mr. Walker published 155 papers on mollusks. Counting new names that he substituted for preoccupied names, he is to be credited with 143 species. A paper of his on *Ancylus* was issued by the NAUTILUS in 1902. Before the studies of the Ancylidae were halted, he had prepared twenty-five papers on this subject alone, brought together an extraordinary collection of the family and obtained virtually all of its literature. Besides being a remarkable record for painstaking, this will probably stand as his best work. A second interest had a patriotic slant. It consisted of compiling catalogues of the shells of Michigan. Five such catalogues were made, and at his urging the Museum of Zoology of his university put out a semi-popular handbook on the mollusca of the state.

It seems likely that the work Mr. Walker did in his "free" hours could not have been performed if it were not that he had acquired speed in his labors and a singularly retentive memory for minutiae. Where many of us rewrite and revise and irresolutely set down our statements, he commonly wrote his papers only once. Facts, references, footnotes and everything needed marshalled themselves for him like proud, regimented soldiery, and the end of the paper actually meant the end and not irksome reincubation. Only four pieces of incomplete or unpublished work have come to light.

Older students will remember the serrate handwriting that was likely to lapse unconsciously, as Sterki's did, into a self-devised shorthand and sometimes bring bewilderment rather than enlightment. For illustration, "Salm T R. Marq Co. Mich." revealed itself, after translation, to be Salmon Trout River, Mar-

quette County, Michigan. Type-writing, when he adopted it at last, was difficult for him. He felt that it was forced on him, and it vexed his sense of freedom.

A habitual formality in Mr. Walker's letters was likely to give a correspondent who never had met him an impression of over-seriousness. The truth is that in speech he was more often humorous than earnest or grave. He took an enjoyment particularly in jests upon himself. One such jest concerned the lost species *Planorbis multivolvis* Case. He thought at one time that he had found it and announced its rediscovery. Then, one summer, Professor C. A. Davis, whose pursuing problem had to do with the formation of marl and peat in the glaciated area, visited him at his cottage on Lake Superior. He came in one day with a pocketful of the true *multivolvis,* having taken the specimens from a small lake in which Mr. Walker had partial ownership. That, in Mr. Walker's own words, was putting him in his rightful place as a shell collector.

The first section of the Walker will directed that the scientific library and the collection of shells were to go to the University of Michigan. This, clearly, was foremost in his mind, and, indeed, it was the most explicitly set forth provision of the document. Edward Carey Walker had been a regent of the university. He himself was twice a student of the institution. It was in one of its halls that he was chosen to be the second president of the Michigan Academy of Science, and there also that he was given the honorary degree of Doctor of Science. While Dr. A. G. Ruthven was restoring the healthy breath of life to the moribund Museum of Zoology, his warmest encourager and counselor was Mr. Walker. For several years, funds of his sent annual expeditions from the museum into the field and there were numbers of other contributions, lost today to record, that supported educational enterprises. All these bound him sentimentally to the university, and it was as a matter of course that his collections should receive their final housing there.

The public offices that Mr. Walker held were of the unremunerative, "good citizenship" order. He was trustee of Harper's Hospital and trustee of the Detroit Medical College. He was a member of the Wayne County Library Commission for ten years,

for three years, president of the Detroit Museum of Art. He acted as director of the Detroit Zoological Society, the organization which promoted the public zoological park, and for a time its president. Until its absorption into the state conservation department, he served on the Michigan Non-game Licensing Commission. The last of these offices was as a member of the Detroit City Planning Commission.

Calvin Goodrich

HERBERT NELSON LOWE

The Long Beach newspapers of June 11th carried notices of the death of one of the best known West American conchologists. Herbert N. Lowe was born in Minnesota in 1880, and came with his parents to California in 1887, spending short periods in Oakland, Santa Barbara and Pasadena. In 1899 they bought a small tract of land in what was then the outskirts of Long Beach and started a nursery which later grew into an extensive florist's business. With the growth of the city, this land became part of a high class apartment house district.

Mr. Lowe's interest in shells began in his highschool days when he attended a series of classes in conchology given by Professor Josiah Keep at a local "Chautauqua." During his years of active business life he found time for collecting at near-by beaches, and by purchase and exchange built up a large collection. Vol. 13 of the Nautilus, 1899, carried his first paper, the account of a dredging trip to Catalina Island, which secured a number of new species. A trip to Cedros Island, off the coast of Lower California, extended the known range of a number of California species southward.

After his mother's death, about 1925, Mr. Lowe devoted most of his time to conchology, his first long trip being around the world, when he collected in the south sea islands and visited many museums and collectors in Europe. Trips to Florida and Cuba (1927–8) resulted in a very fine collection of land shells of those regions, several of the species being named in his honor.

His best work, and that which seemed to interest him most, was begun in 1929, when he made the first of a series of trips down

that part of the Pacific coast lying between San Diego and Panama. During these trips he visited every port which could be reached by the regular steamship lines. Other places were visited by airplane, private yacht, or by launches piloted by native boatmen. A number of papers in THE NAUTILUS tell of collecting conditions at these places with interesting notes on the ecology of some of the species collected.

Finding the identification of much of the material collected in Mexico and Central America during the first three expeditions a difficult task he took the collections east with him and worked them up with the assistance of Dr. Pilsbry and by comparison with the types in the U. S. National Museum, the Academy of Natural Sciences and the C. B. Adams collection. A list of the species was published in the Proceedings of the Academy of Natural Sciences of Philadelphia, Vol. 84, 1932, together with descriptions of 125 new species and subspecies; an important contribution to the conchology of that coast.

Later trips include a cruise among the islands in the Gulf of California and trips by auto to San Felipe, near the head of the Gulf of California on the Lower California side and to Punta Peñasco and other points on the Sonora side. Descriptions of 26 new species collected on these trips, and a list of the species collected at Punta Peñasco appeared in the Transactions of the San Diego Society of Natural History, Vol. 8, No. 6, 1935. On his last expedition, to San Blas, Mexico, in December, 1935, some fine material was secured, which had not been worked up at the time of his death.

Mr. Lowe made large contributions from his West Mexican and Central American material to the Museums of the Academy of Natural Sciences of Philadelphia, Stanford University, the California Academy of Sciences and the University of California at Los Angeles. Under his will his conchological collection and library, together with an endowment fund of $25,000 for the maintenance of the collection, is to be given to the San Francisco Society of Natural History upon the condition that it will be known as the "Herbert N. Lowe Conchological Collection."

Mr. Lowe had been a member of the Conchological Club of Southern California for several years and was its president for

the last two years of his life. Upon his death the following resolution was adopted:

Resolved: that it is the sense of this meeting that our Club and conchological students in general have sustained a distinct loss. And it is hereby moved that one copy of this resolution be spread on the official minutes of the club, another sent to Mrs. Ella Gaylord, sister of Mr. Lowe, and a third be sent to The Nautilus.

He was also a member of the Academy of Natural Sciences of Philadelphia and the American Malacological Union and was elected to its Board of Directors in 1934.

A. M. Strong and Elsie M. Chace

BOSTON MALACOLOGICAL CLUB

The Boston Malacological Club has met regularly during the past season in the rooms of the Boston Society of Natural History, the meetings, eight in number, from October to May, inclusive, falling on the first Tuesday evening of each month.

Five new members have joined during the year, and the Club now has the largest number in its history, as well as a substantial "nest-egg" in the bank—the bequest of a member who died last year.

The October meeting was devoted, as usual, to the summer experiences of members, in collecting, or in travel, and visiting European collections. In November, Dr. Irwin W. Sizer, of Massachusetts Institute of Technology, gave a paper on Oyster Pest Control, describing research work done in Delaware Bay, in the war on the destructive "drills," *Urosalpinx cinerea,* and *Eupleura caudata.* At the December meeting, Mr. William J. Clench and Mr. Henry D. Russell gave an account of some weeks spent on little-known Cat Island, in the Bahamas—the topography of the island, and their collecting. A fine series of moving pictures added to the interest of their talk. In January the Club was addressed by Dr. Standish L. Deake, of the Division of Fisheries and Game for Massachusetts, who told of the work done in conservation of natural resources, including the propagation in hatcheries and faunas, of fish and game, and its distribution in suitable localities. Dr. Joseph C. Bequaert, of the Department

of Tropical Medicine, Harvard Medical School, was the speaker in February, his subject being African marine mollusca. At the March meeting, Miss Bernadine Barker gave an account of a trip to the West Indies, which included collecting on many of the beaches, and showed moving pictures of places visited. On the same evening, Mr. Russell showed moving pictures in color greatly enlarged, of New England nudibranchs in their native pools. These elicited much admiration from those present. Dr. Hervey W. Shimer, of Technology, spoke in April, on Brachiopods, illustrating his paper with specimens and drawings, and at the final meeting, in May, Dr. David L. Belding showed tables and charts in connection with his researches into the growth of *Venus mercenaria* of Prince Edward Island. The annual Field Day of the Club, in June, starting from Worcester, Massachusetts, enabled members to do collecting at various points on Cape Ann.

Officers for the coming year, elected at the May meeting, are:
President, Henry D. Russell.
Vice-president, Bernadine Barker.
Secretary-Treasurer, Theodora Willard.
Conchological Recorder, S. N. F. Sanford.
Executive Committee, {Mildred Seymour. / William J. Clench.}

THEODORA WILLARD, *Secretary*

SOME ERRONEOUS AND MISLEADING RECORDS ON OCCURRENCE OF SHELLS OF THE HELMINTHOGLYPTA CUYAMACENSIS GROUP

BY WENDELL O. GREGG

In checking over the records of occurrence of the shells of this little known group, several obvious mistakes and misleading records have come to my attention. In 1931, S. C. Field[1] reported *H. cuyamacensis avus* Bartsch from "the foothills of the Tehachapi Mts. in San Bernardino County." In the first place this is no less than a misstatement as the Tehachapi Mts. have never been in San Bernardino County, California. From 1850 to 1852 this area was included in Mariposa County. From 1852 to 1866

[1] NAUTILUS, 45: 29.

it was included in Los Angeles County. In 1866 Kern County was created and from that date to the present its boundaries have included the Tehachapi Mts. and their foothills. A careful search of Mr. Field's notes (with the Field collection and now in the possession of Mr. F. R. Aldrich) reveals the more definite locality "Tejon Ranch." This is located in the foothill region on the northwest side of the Tehachapi Range. Bartsch[2] gave as the type locality of *avus* "Los Angeles County, California," and the fact that there have been many changes in our county boundaries makes such a locality record still more vague and uncertain. Mr. George Willett and I have examined the specimens collected by Mr. Field and we are of the opinion that they are correctly identified. The indefinite type locality given by Bartsch led the writer on numerous field trips within the present boundaries of Los Angeles County with the vain hope of rediscovering this subspecies. Such efforts however were far from wasted as they led to the discovery of no less than three well-defined forms of *Helminthoglypta* which had previously been undescribed. If further search fails to reveal *Helminthoglypta cuyamacensis avus* Bartsch within the present limits of Los Angeles County we may redefine the type locality as foothills on northwest side of Tehachapi Mts., Kern Co., Calif., particularly since this area was previously included in Los Angeles County.

In the same article Mr. Field reported *H. c. venturensis* Bartsch from the eastern end of Soledad Canyon, Los Angeles County. Through the courtesy of Mr. Aldrich I have examined these shells and find them to be none other than *H. fontiphila* Gregg[3] which I have taken from a number of places in that canyon. As pointed out in a previous article the differences between these two forms are very definite.

Mr. E. P. Chace calls my attention to an article by himself appearing in "Lorquinia"[4] which also calls for comment. In this article he lists the land snails which had been found by the members of the Lorquin Natural History Club. Under *Helminthoglypta cuyamacensis* Bartsch he gives the following: "One

[2] Proc. U. S. Nat. Mus., vol. 51, p. 610.
[3] Nautilus, 45: 50.
[4] *Lorquinia,* vol. 2, p. 12, 1917.

immature specimen that is apparently of this species has been found near Dawn Mine, Millard's Canyon [Los Angeles County]." I have not had an opportunity to examine the shell here referred to but it is unquestionably *H. petricola sangabrielis* Berry.[5] The immature shells of the papillose forms of *Helminthoglypta* are difficult and in many instances impossible to identify, but in the case of the Millard Canyon record sufficient adult material has since been taken from this locality to definitely establish what forms are to be expected there.

In the article[6] in which Dr. Bartsch originally described *H. cuyamacensis cuyamacensis,* he mentions two young specimens collected by Kelsey from "Paloma Mountains, San Diego County, California, which he refers to that subspecies. This locality is almost certain to be a misspelling of Palomar Mountains from which locality Bartsch later described *H. c. lowei.* As typical *cuyamacensis* does not occur at this locality these two young shells could be none else than *H. c. lowei.*

NOTES AND NEWS

Wilhelm A. Lindholm, 1874–1935.—Dr. Lindholm, in charge of the mollusk collections of the Academy of Sciences of Leningrad, died in that city September 17, 1935. He published much useful work on mollusks of Lake Baikal, the Crimea, Caucasus region and other parts of the U.S.S.R., and on Palaearctic mollusks generally.

Drymaeus multilineatus latizonatus, new subspecies.—The typical form of *D. multilineatus* has dark bluish apical whorls, and on the later whorls unequal, unevenly spaced, slanting brown stripes on pale buff to nearly white ground, with a narrow dark subsutural band and a dark basal area, and usually a narrow band in the middle of the basal slope. Binney's figure in Manual American Land Shells, p. 404, f. 443 (copied from Terr. Moll. 3, pl. 58) is unlike any *multilineata* I have seen, as it has a dark band in the middle of the upper surface in addition to the typical bands described above. Many years ago (1912), Mr. Morgan

[5] Proc. Calif. Acad. Sci., vol. 10, no. 8, p. 62.
[6] Proc. U. S. Nat. Mus., vol. 51, p. 611.

Hebard, who was collecting Orthoptera, gave me a wide-banded form he found at the south end of Long Key. Later (1933) Mr. Paul McGinty found the same form on Lower Matecumbe Key, and I named it *D. m. latizonatus* in the collection. It differs from *multilineatus* by having the subsutural seal-brown band much wider (2 mm. or more), and the basal dark area covers most of the base, the band above it being wider than in *multilineata.* The slanting streaks are somewhat heavier than usual in that species, but its chief feature is the exaggeration of the spiral markings. Type 160880 ANSP., from Lower Matacumbe Key.—H. A. Pilsbry.

Trochonanina and Diastole.—*Trochonanina* Mousson [1869, Jour. de Conch. 17: 330], proposed as a sg. of *Nanina* in a discussion of *N. schmeltziana* Mouss. [1865, J. de C. 13: 167], included, without type selection, additional species, among them *Helix mozambicensis* Pfr. [1855, P.Z.S. London: 91], from Africa. Unfortunately, the prior subsequent designation of type appears to be that of Kobelt [1880, Conch. Ill.: 217], who chose "*Helix mossambicensis* Pfr." Unless Kobelt's misspelling invalidates his action, *Trochonanina* must replace *Ledoulxia* Bourguignat (1885). *Trochonanina* "Mousson" Garrett [1884, Jour. ANSP. 21] with designated type, *Nanina schmeltziana* Mouss., from Samoa, becomes *Diastole* Gude [1913, Malac. Soc. London 10: 391], type by original designation, *Helix conula* Pease [1861, P.Z.S.: 243], from Tahiti. I hope somebody can confute these legal sophistries.—H. B. B.

Hojeda inaguensis (Weinland).—Anatomy of animals collected July 2, 1936, under rocks on Stock Island, Florida Keys, is very similar to that [1926, Occ. P.M.Z.U. Mich., no. 167: 13] of *H. vanattai* (H.B.B.), as prophesied by Dr. Pilsbry [1926, Proc. ANSP. 78: 120], but shows some approach to that of *Hyalosagda,* sg. *Lacteoluna* (sect. *Strialuna, Microsagda, Aerotrochus* and s.s.). The unbranched penis proper shows a short, ovoid caecum beyond the epiphallar opening (like in *A.* but bigger) and is encircled near its middle by a muscular band (as in *A.*). The spermathecal retractor [*cf.* 1935, Naut. 48: 135] inserts around the tapered apex of the secondary spermatheca and parallels the

spermathecal duct for a short distance (like in *M.*). The penial retractor inserts near the vas deferens (as in *S.*). The later shell-whorls of *Hojeda* have fine rib-striae (like in *S.*) and accumulate dirt more or less evenly (*i.e.*, not forming costae or points along coarser growth-wrinkles as in *A.* and *L.* s.s.).—H. Burrington Baker.

Liguus at Northwest Cape Sable, Monroe County, Florida. —In 1885 Charles Torrey Simpson, on his first field trip in lower Florida, found at Northwest Cape Sable a colony of *Liguus* resembling the typical *Liguus crenatus* Swainson of Cuba. This form with its elongated shape and green spiral lines was named *Liguus crenatus capensis* Simpson. We were surprised to find on our visit to the Cape that the green lines associated with this form were almost totally absent. The fringe of hammock at the Cape had been rather thoroughly worked and we were at loss to account for the change in character. In Miami I learned from Mr. Albert Pflueger of a small isolated hammock just to the north of the one we visited in which individuals do have the green lines of Simpson's original lot. Mr. Pflueger's extensive field-work as a taxidermist has taken him to many remote places in Florida resulting in many valuable contributions to the field of conchology. He also tells me that Northwest Cape is not, as supposed, a pure colony of *Liguus crenatus capensis* Simpson, for specimens of the yellow *Liguus crenatus lossmanicus* Pilsbry have been taken. —Thomas L. McGinty, Boynton, Florida.

How Some Snails Survive Grass Fires.—A curious example of the ability of one species of land snail to survive fires, while another species of the same genus at the same station succumbs, came to light last winter. In Pinellus County, Florida, the peninsula on which St. Petersburg is located, it is quite customary to burn the grass and weeds from vacant tracts and lots at intervals. The fires are of short duration, but hot while they last. In Long Key we searched for snails at many stations that all showed evidence of recent fires, some of them but a few months back, from Pass-a-Grille northward. Invariably we found a few *Euglandina rosea* (Fér.), and numerous *Polygyra cereola* (Megerle), all dead, *Succinea,* partly alive, and *Polygyra uvulifera* (Shuttleworth) in

abundance, mostly alive. While I was puzzling over this discrepancy, D. L. Emery one day remarked that the favorite cover for *P. uvulifera* is among and beneath the thick basal leaves of a species of thistle. We visited the localities and found it to be true. We also found some Succineas alive under the leaves, but no *Euglandina* nor *P. cereola.* The leaves provided complete protection for the *P. uvulifera,* which then spread rapidly from their haven of safety and repopulated the surrounding areas.—JUNIUS HENDERSON, University of Colorado.

HELIX AXIA BGT. AND HELIX LACTEA MÜLLER IN FLORIDA.—Early in 1936 D. L. Emery led me to a colony of *Helix* (*Otala*) *axia* Bgt. at Pass-a-Grille, southwest of St. Petersburg, Florida. There were many dead shells on some vacant lots, where grass fires had wrought havoc with the snails. However, under lilies and other cover on one lawn we obtained about two dozen live adults and saw many immature ones, which were not taken. Later Mrs. Henderson and I visited a colony of *Helix* (*Otala*) *lactea* Müller, under the guidance of Mr. Emery, accompanied by Norman W. Lermond and Miss Florence Nelson. It is on Cabbage Key, near Pass-a-Grille. The key was once inhabited, but has been unoccupied for several years. The buildings have been destroyed by fire and there is abundant evidence of grass and brush fires in and about the former garden tract. Dead shells were abundant, but we found only a few immature and one mature snail alive. Probably the introduction of these Old World snails at both localities was rather recent, as we found no old shells buried in the sand at either place. They are both natives of Southern Spain, Morocco and Algeria, and were probably introduced to Florida for food purposes. Specimens from each colony were sent to Dr. Pilsbry and identified by him as above indicated. Mr. Emery also furnished us with specimens of *H. lactea* from Niagara Falls, N. Y. Dr. Pilsbry writes that he has it from markets in New York City, Baltimore, Philadelphia and Buffalo.—JUNIUS HENDERSON, University of Colorado.

DR. C. MONTAGUE COOKE, JR., malacologist on the staff of B. P. Bishop Museum, Honolulu, has been elected corresponding member of the Natural History Museum of Vienna, in recognition of his publications and work in assembling materials and records relating to Pacific land snails.

THE NAUTILUS

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THE TYPE LOCALITY OF *OREOHELIX STRIGOSA* (GOULD)

BY ALLYN G. SMITH

Who collected the first specimens of *Oreohelix strigosa* (Gould) and where were they found?

This is a question that has piqued the interest of students of this genus of West American land snails for a long time and probably it can never be answered with exactitude. However, some new material collected relatively recently on the Columbia River in Washington, has revived interest in the type locality of *strigosa,* and this, together with a review of the itineraries of the explorers to when its discovery is attributed, have led to some deductions and conclusions that will, it is hoped, result in fixing the general locality, if not the exact place where it was discovered.

As is well known, *O. strigosa* was described from shells collected in 1841 by the U. S. Exploring Expedition under the leadership of Commander Charles Wilkes. The locality was first given by Gould as the "Interior of Oregon,"[1] a sizeable territory, as the "Oregon" of that day included what is now the states of Oregon, Washington, Idaho, and part of Montana, its nebulous boundary extending northward into British Columbia. In 1856, ten years after it was described, Gould figured *strigosa,* and in 1852 said that it "Inhabits Puget Sound (Pickering): Columbia River (Drayton)."[2]

Conchologists interested in *Oreohelix* have known for a long time that Puget Sound as a locality for *strigosa* was an error, and out of the probable range of the genus. The Columbia

[1] Gould, A. A. Proc. Boston Soc. Nat. Hist. vol. 2, 1846, p. 146.

[2] Gould, A. A. U. S. Explor. Exp. Moll. 1852, p. 36; Atlas, 1856, pl. 3, figs. 41, 41a, 41b.

River, however, being partly in the "interior of Oregon" remained as the possible territory in which to look for the "lost" species, but even this presented some difficulties, as the river is about 1400 miles long from source to mouth. Perhaps this explains the fact pointed out by Henderson in 1929,[3] that "three quarters of a century have elapsed and no one has found it in either the Puget Sound Basin or along the Columbia River, but for that matter no one has found it with any certainty anywhere else." Even the experienced collectors J. G. Cooper and Henry Hemphill, who did much work along the Columbia, did not come across it.

Commander Wilkes' narrative of the U. S. Exploring Expedition[4] not only makes interesting reading for those who like early discovery but it provides information on the possible type locality of *O. strigosa*. Two of the Expedition's overland parties are of special significance.

The first of these was commanded by Lt. R. E. Johnson and among its personnel was Charles Pickering, Expedition naturalist, and J. D. Brackenridge, assistant botanist. After leaving the base at Fort Nisqually, this party crossed the Cascades (probably at Natches Pass) and reached the Columbia River somewhere near Vantage Ferry. They went north along the west bank, crossed the Wenatchee and Entiat Rivers by means of Indian canoe, crossed the river three miles north of Entiat and then went out of the valley of the Columbia, not reaching the river again until their arrival at Fort Okonagon, at the mouth of the Okonagon River. They then explored the Grand Coulée and proceeded north, reaching the Columbia a third time and followed it to Fort Colville. From Fort Colville the party went into Idaho, then came south to Walla Walla, proceeded up the Columbia River to the Yakima River which they followed upstream, finally crossing the Cascade Mts. on the way back to their base the same point as before. According to Wilkes, this party made a large addition to the plant collection but unfortunately he did not mention any other specimens that may have been obtained.[5]

[3] Henderson, Junius. Univ. Colorado Studies, vol. 17, no. 2, 1929, pp. 88–89.

[4] Wilkes, Charles. U. S. Explor. Exped. vol. 4, 1849.

[5] *Ibid.*, p. 170.

The second party was really a one-man expedition, undertaken by the Expedition's artist, Mr. Joseph Drayton, who accompanied a Hudson Bay Company boat "brigade" carrying supplies to the forts up the river and to interior posts. The trip proved strenuous as portages had to be made around the Cascades of the Columbia, the Dalles, and the mouth of the Deschutes River. Drayton left the brigade at Fort Walla Walla, visited Dr. Marcus Whitman at his mission, and made a horseback trip to the Blue Mountains. Returning to the Fort, he remained there thirteen days sketching and making notes and then proceeded to the Cascades of the Columbia on horseback, taking five days for the trip, and finished his journey to Fort Vancouver by boat. Drayton also did some collecting as Wilkes testifies at several points in his narrative.[6] Later he drew the figures for many of the beautiful illustrations for the reports for the Expedition, including those of *O. strigosa.*[7]

Although Gould mentioned Drayton as one of the collectors of *O. strigosa,* one is led to question this in view of his itinerary up the Columbia River, the short time that must have been available for collecting en route, and the results of more recent work. The fact that Dr. Pickering, with Lieut. Johnson's party, is also mentioned is significant in view of later findings and because the "Puget Sound" locality is now recognized as an obvious error.

Some of the ground explored by the Johnson party and by Drayton was covered by the writer in 1931 and is now accessible over excellent paved highway. *Oreohelix,* conforming closely with Gould's original description except for average size and color-banding, was collected in rock slides at the confluence of the Entiat River with the Columbia, about 15 miles south of the lower end of Lake Chelan. This locality is interesting in view of the following passage from Wilkes on the intinerary of Lieut. Johnson's party:

"On the 6th, after travelling seven miles they reached the banks of a small stream, called by the Indians Entitecoom, but known to the Canadian Voyaguers as Point de Bois. . . ."[8]

[6] *Ibid.,* pp. 315, 366, 378, 380.
[7] *Ibid.,* p. 324.
[8] *Ibid.,* p. 431.

Being one hundred feet wide at the mouth and too deep to ford "they therefore continued up [this] stream for about a mile and a half" without finding a suitable place to cross, returned to the mouth, were ferried across in canoes with Indian assistance, proceeded north along the Columbia for three miles, and then were forced to cross it, again with the help of friendly Indians.

Inasmuch as a few additional specimens of the same race of *Oreohelix* were collected four miles north of the mouth of the Entiat River in 1931 it would have been possible for Dr. Pickering to have collected *Oreohelix* in the exact same place, or very near it, in the process of taking botanical and other specimens. The north bank of the Columbia, for several miles above and below the Entiat, is close to the valley wall, which is precipitous and covered toward its base with talus slides that would afford excellent cover for *Oreohelix.*

William B. Marshall, late of the U. S. National Museum, kindly supplied information on the type specimen of *O. strigosa,* and commented on a series of shells from Entiat that were forwarded to him for comparison.[9]

He wrote:

"We have the specimen figured in the Exploring Expedition and it is no. 5441 of our collection, is marked type, and the locality given as Puget Sound. There is no doubt that it is the specimen shown in plate 3, figures 41, 41a, and 41b. . . . The specimen that we have here and that we regard as type, is smaller than the measurement given by Gould. Its diameter is only ¾ of an inch. This would be in the neighborhood of 4mm. less than the 9/10 of an inch given by Gould."

"Of the Entiat specimens I may say they are larger, the aperture is somewhat rounder and less oblique than the type, the basal and interior colors of the specimen returned to you are almost exactly like the type and the colors of the spire are very similar, but in the one returned there are here and there faint indications of narrow spiral bands, and in most of the specimens kept here there is a distinct spiral chestnut band. The type has no band in the upper surface. The returned specimen [now Calif. Acad. Sci. No. 5843] has the nucleus a little larger than in the type but some of those kept here have the nucleus about the same size as in the type."

Thus it seems logical to assume that the type locality of *O. strigosa* can be fixed definitely in the Valley of the Columbia River, probably at the point where the Entiat River enters it, or at least not far from this point. Farther down the Columbia, between Celilo and Rufus, on the Oregon side of the river, *O.*

[9] Marshall, Wm. B. Letters dated October 24, and November 17, 1931.

variabilis Henderson is found. Farther up the river, on the steep slope bordering the south side of Lake Chelan, a totally different race was collected. However, much collecting must yet be done over a considerable territory along the Columbia above Umatilla before the limits of the range of typical *O. strigosa* can be defined.

THE FAMILY *CYPRAEIDAE* IN THE HAWAIIAN ISLANDS

BY WILLIAM M. INGRAM
University of Hawaii

The confusion which results from the inclusion, in various collections of and articles on Hawaiian *Cypraeidae,* of cowries which do not occur within hundreds of miles of the Hawaiian archipelago, warrants a paper which segregates the Hawaiian species from those found in other regions of the Pacific. This article will summarize in a check-list those species which are found in Hawaii, eliminating those which are foreign.

Of the many species of the genus *Cypraea,* twenty-nine are found in Hawaii. Most of these may be taken in the shallow reef waters, although with the exception of *Cypraea caput-serpentis* L., none is common. The author has collected eleven species of the total number, and has obtained three in the fossil state.

To Mr. Jens Mathias Ostergaard I wish to express my sincere appreciation for his helpful encouragement and assistance. I am indebted to Mr. David Thanuum for the use of specimens in his private collection, and to Mr. Edward Bryan for his courtesy in allowing me to use the shells housed in the Bernice P. Bishop Museum, Honolulu.

CYPRAEA ARENOSA Gray, Zool. Jour., i, p. 147, pl. 7, 12, f. 6, 1824

This species is dying out in the Hawaiian Islands and is very rare.

In 1905 Mr. Jens M. Ostergaard collected four individuals from the Honolulu Harbor dredgings.

There are three specimens in the L. A. Thurston collection which is housed in the Bernice P. Bishop Museum, Honolulu.

One of these was taken at North Kona, Hawaii, August 30, 1925. Two were taken between Punnoa Point and Mala Wharf, Lahaina, Maui, June 1925.

Mr. David Thaanum has four specimens collected at Lahaina, Maui in 1936, and two others that were collected in about twenty fathoms of water at Waikiki, Oahu, also in 1936.

Mr. Ted Dranga has five specimens in his collection: one was taken at Waikiki, Oahu, August 9, 1936; three were collected at Lahaina, Maui, June 1936, and one specimen was taken at Fort Kamehameha, from the channel entrance of Pearl Harbor, January 25, 1927.

CYPRAEA ANNULATA Gray. Zool. Jour., iv, p. 88, 1829

Although rare in Hawaii, this shell has been taken in dredgings from the Honolulu Harbor.

CYPRAEA CAPUTSERPENTIS Linnaeus. Syst. Nat., p. 1175, 1767

In Hawaii this is the commonest species of the genus. It shows a racial difference from the South Pacific form by darker marginal filling and brown interstices between the teeth.

CYPRAEA CARNEOLA Linnaeus. Syst. Nat., p. 1174, 1767

Several very large specimens which came from the island of Maui are in the Thurston collection in the Bishop Museum. It is not abundant; the author has taken a number of specimens from the washed dredgings from Honolulu Harbor and from Sand Island in the Harbor.

CYPRAEA CICERCULA var. TRICORNIS Jousseaume. Revue et Mag. Zool., p. 9, pl. 1, f. 3, 4, 1847

The typical *Cypraea cicercula* L. has the base of the shell painted with four conspicuous chestnut spots, while the Hawaiian variety has never been collected possessing these spots. This is never taken alive, but is quite common in the old dredgings from Honolulu Harbor.

CYPRAEA CRUENTA Gmelin. Syst. Nat., p. 3420, 1790

Quite rare in number of individuals collected alive, this species is fairly common on some of the Islands as beach shells.

CYPRAEA EROSA Linnaeus. Syst. Nat., p. 1179, 1767

This species is apparently almost extinct in Hawaii, but common in the fossil state on Oahu.

CYPRAEA FIMBRIATA Gmelin. Syst. Nat., p. 3420, 1790

This is the smallest of the Hawaiian cowry shells. A large specimen is about half an inch in length. It is not uncommonly taken alive, and is quite common in the beach sands.

CYPRAEA HELVOLA Linnaeus. Syst. Nat., p. 1180, 1767

Robert's note on the Hawaiian form is as follows, "Those shells from the Sandwich Islands are often pale yellow, faintly spotted, with a whitish base and extremities."[1] This description applies only to the faded dead shells which were dredged in vast quantities from Honolulu Harbor channel at various times. It is common as a beach shell, but rarely taken alive.

CYPRAEA ISABELLA Linnaeus. Syst. Nat., p. 1177, 1767

This species is common, but rarely taken because of its concealment in coral heads.

CYPRAEA LYNX Linnaeus. Syst. Nat., p. 1176, 1767

This form is very rare, although an occasional shell may be taken on the beaches. The author has taken but one specimen, a fossil, embedded in limestone on Sand Island.

CYPRAEA MADAGASCARIENSIS Gmelin. Syst Nat., p. 3419, 1790

This is one of the five endemic Hawaiian species. It is rarely taken alive, but is commonly picked up on the beaches of the Island of Kauai. It is also not an uncommon beach shell on Oahu.

CYPRAEA MAURITIANA Linnaeus. Syst. Nat., p. 1176, 1767

The Mauritius cowry is one of the largest of the Hawaiian forms. It is always taken where there is a strong, breaking surf. It is quite common, being sold as a curio in many of the stores on Oahu.

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[1] Roberts, "Monograph of the Family Cypraeidae," *Manual of Conchology*, Vol. 7, p. 194, 1885.

CYPRAEA MONETA Linnaeus. Syst. Nat., 1178, 1767

The money cowry is apparently restricted to three localities on the Island of Oahu: Kaneohe Bay, Kewalo Basin, and Waikiki. It is not at all common.

CYPRAEA NUCLEUS Linnaeus. Syst. Nat., p. 1181, 1767

Occasionally an individual of this species is collected along the beaches. It is very rare; a number were obtained in the dredgings of the Honolulu Harbor.

CYPRAEA OSTERGAARDI Dall. Nautilus, vol. xxv, pp. 49, 50, Oct., 1921

Only nine specimens have ever been collected. Mr. Ostergaard collected five, and four have been found since his first collection. This form is one of the endemic species.

CYPRAEA PEASEI Sowerby. Thes. Conch. Cyp., No. 113, f. 167, 168, 1870.

The shell is thin and light, the most delicate of the Hawaiian Cypraeidae. It is rare. Mr. Jens. M. Ostergaard has eighteen specimens taken from Honolulu Harbor dredgings of 1905 and 1915.

Mr. David Thaanum has twenty specimens taken at Hilo, Hawaii, and one specimen from Waikiki. The Hilo specimens were collected in 1920; the Waikiki specimen in 1936.

Mr. Ted Dranga has one specimen in his collection taken at Waikiki, Oahu, September, 1936.

CYPRAEA PORARIA Linnaeus. Syst. Nat., 1180, 1767

This shell is often found on the beaches. It is rarely taken alive.

CYPRAEA PUNCTULATA Gmelin. Syst. Nat., p. 3404, 1790

This shell is quite common in the dredgings from Honolulu Harbor. The beach shells are not uncommon. It is rarely taken alive.

CYPRAEA RASHLEIGHANA Melvill. Jour. of Conch., V., p. 288, pl. ii., f. 26, 1887

Beach shells of this species are only occasionally collected, but it is frequently found in dredgings from Honolulu Harbor.

CYPRAEA RETICULATA Martyn. Universal Conchology, pl. 15, 1782

This shell is fairly abundant, being taken alive and as a beach shell on Rabbit Island, Oahu, and elsewhere.

CYPRAEA SEMIPLOTA Mighels. Proc. of the Bost. Soc., ii, p. 24, 1848

One of the endemic species, this form is found in quantity on the beaches, and the live mollusk is almost as frequently found in the shallow reef waters.

CYPRAEA SCURRA Chemnitz. Conch. Cab. vol. x, pl. 144, p. 103, f. 1338, 1788

This species is rare in both the living and dead states. Mr. Jens M. Ostergaard collected four individuals in dredgings from Honolulu Harbor in 1915.

Mr. Ted Dranga took one live specimen at the channel entrance of Pearl Harbor, near Fort Kamehameha, January 25, 1927.

The author has ten specimens taken in 1935 and 1936 from the old Honolulu Harbor dredgings at Fort Armstrong, Oahu.

CYPRAEA SULCIDENTATA Gray. Zool. Jour., i, p. 148, 1824

One of the endemic species, this mollusk is not uncommon in the Honolulu Harbor dredgings. The living and dead forms are to be collected in greater quantity on the Pearl and Hermes Reef than anywhere else on the Islands. The author has taken two live shells off the shores of Rabbit Island, Oahu.

CYPRAEA TALPA Linnaeus. Syst. Nat., p. 1174, 1767

Occasionally an individual of this species is taken alive. Dead shells in almost perfect condition may be found in the dredgings on Sand Island in Honolulu Harbor.

CYPRAEA TESSELLATA Swainson. Zool. Jour., i, p. 150, 1824

An endemic form, this shell is very rare. Dead, it is to be found occasionally on the beaches and, more frequently, on Pearl and Hermes Reef.

CYPRAEA TIGRIS Linnaeus. Syst. Nat., p. 1176, 1767

This is the largest and possibly the rarest of the Hawaiian *Cypraea*. Mr. David Thaanum has one specimen in his collection that was collected alive by Mr. Thaanum and Mr. Dranga on the reef at Lahaina, Maui, 1936. This is the first authentic record of this species being taken alive in the Hawaiian Islands. One specimen was taken alive by two men with a diving helmet off the Waikiki reef in front of the Royal Hawaiian Hotel, 1936. This specimen is now in Mr. Ted Dranga's collection.

CYPRAEA VITELLUS Linnaeus. Syst. Nat., p. 1176, 1767

Several specimens have been collected in the fossil state on Oahu.

It is very rarely taken alive. Mr. Ted Dranga has two individuals collected by Mrs. Paul Byer on the reef at Moku O Loe Islet in Kaneohe Bay, Oahu.

Mr. Jens M. Ostergaard has in his collection two specimens which he himself took on the Waikiki reef, Oahu.

The author has one specimen in his collection that was collected by Mrs. R. T. Christofferson on Moku O Loe Islet reef in Kaneohe Bay, Oahu in 1927, and one specimen that was dredged from Honolulu Harbor, Oahu.

Mr. David Thaanum has three specimens taken in Kaneohe Bay, Oahu, 1916.

CYPRAEA CHILDRENI Gray. Zool. Journal, vol. i, p. 518.

Mr. Jens M. Ostergaard collected two dead specimens from the Honolulu Harbor dredgings, and has observed a number in the fossil state in the limestone outcroppings on the island of Oahu.

GONIOBASIS COLUMBIENSIS WHITEAVES

BY CALVIN GOODRICH

Through the kindness of Mr. Aurèle La Rocque of the National Museum of Canada, I have been privileged to examine the types of *Goniobasis columbiensis* Whiteaves. The species was described and figured in the NAUTILUS, 19, 1905: 61, 62. The specimens had been collected twenty-two years before this, the locality being

given as "Headwaters of the Columbia River, at Upper Columbia Falls, in the East Kootenay District of British Columbia."

Whiteaves said he had thirty-seven individuals. Those now in the type lot number twenty-seven. No measurements are supplied, but those of one figure are approximately 23.75 mm. altitude, 13 mm. diameter; of the other 19 mm. altitude and 11.50 mm. diameter. The largest at present in the type lot is 11.25 by 8 mm. The average for the ten largest is 12.60 by 7.02 mm. It is likely that the figures represent enlargements rather than missing specimens, and that the measurements of the shells illustrated were not taken for making the drawings.[1]

The spiral ridges or keels of Whiteaves' description, observed in the immature shells, are merely a feature of adolescence and virtually a constant in *Goniobasis*. In these shells, they are angulations following the carinae of infancy and preceding the rounding of the adult body whorl. The "very numerous and closely disposed striae" are microscopic, as Whiteaves says, but they do not occur in all the specimens as might be inferred from the description. The ratio of specimens so sculptured to the unsculptured mollusks is one to three. Two other shells have faint spiral malleations on the upper whorls. Spiral striae sometimes appear in species that are ordinarily smooth. All members of a colony may have them, which would suggest a racial modification, or only a few individuals, as in these types of *columbiensis*. They could be caused simply by a slight folding of the mantle edge where the calcic glands are concentrated. Whiteaves states that the opercula were not preserved. They are still present, but are deeply withdrawn in the shells. One was obtained by soaking in water and exercising a little patient manipulation. It is neomelanian, and as regards the position of the nucleus and the coiling of the spiral lines it is unlike the operculum of any West Coast *Goniobasis* with which I have been able to compare it.

Comparison of the mollusk is made with *G. livescens* (Menke) by Whiteaves, *livescens* being the common pleurocerid of Ontario.

[1] Three of the original specimens were presented to the Acad. Nat. Sci. Phila. by Whiteaves, (No. 90181). The adult figured measures 13.8 mm. long, 8.5 mm. wide, the smaller, immature shell 11.4 × 6.5 mm.; figures drawn by the editor.—Ed.

Shells closely resembling *columbiensis* have been taken in Niagara River and the Maitland River at Goderich, Ontario; also in streams of Ohio discharging into Lake Erie and in the upper Wabash River. My own belief is that *columbiensis* is, in fact, *livescens,* and that in the twenty-two years aforementioned—time enough for many grievous things to happen in a museum—labels were mixed and the shells became finally and improperly assigned to British Columbia. There is, of course, the possibility that the species is a depauperate form of some member of the *G. plicifera* group which inhabits the Columbia River. *G. aterina* Lea, *acutacarinata* (Lea) and *proxima* (Say) of the southern Appalachian country are depauperates as is also *G. nigrina* (Lea) of northern California. Improverishment is marked in *aterina,* for one thing, by a flattening of the whorls; in *acutacarinata* by an extreme convexity of the whorls and in *nigrina* by convexity somewhat less pronounced. The whorls of depauperate examples of *livescens,* occurring sometimes in springs, are flattened, tightly-coiled.

G. columbiensis has the slightly produced aperture, the sinuous lip, the flattened upper whorls, the neo-melanian operculum and the general appearance of *G. livescens.*

A CALIFORNIAN *POMATIOPSIS*

BY H. A. PILSBRY

POMATIOPSIS CHACEI, new species.

The shell is somewhat similar to *P. californica* Pils., but differs by being of more slender shape and in sculpture. It is brownish olive with whitish apex, composed of 5 strongly convex whorls, the apex rather obtuse. Sculpture of very light wrinkles of growth and a close, fine, microscopic spiral striation, the striae waved, visible chiefly on the last whorl. Umbilicus moderately open. Aperture of the usual widely ovate shape, brown within, the peristome simple, the columellar and parietal margins thin. Length 4.4 mm. diam. 2.7 mm., length of aperture 1.8 mm.

From a swampy place 6 miles up the highway from Klamath, Humboldt Co., California, collected by E. P. and E. M. Chace, 1933 and 1936. Type and paratypes 168402 ANSP., other specimens in the Chace collection.

This is the third Californian *Pomatiopsis*—more than in any other state. *P. binneyi* (Tryon) is much smaller than *chacei*, relatively wider, with a decidedly thickened inner lip. None of the Californian species has yet been observed alive to see whether they have the peculiar gait of *P. lapidaria*.

ONCHIDIUM (ONCHIDELLA) FLORIDANUM DALL

BY WILLIAM J. CLENCH

Nothing additional concerning this species has been published, apparently, since the original description by Dall (Proc. United States Nat. Mus. 8, p. 288, Aug. 1885). The original locality, Knight's Key, is located in the lower Florida chain of Keys just west of Key Vaca, and the only locality given.[1]

Surprisingly enough, *O. floridanum* is one of the most abundant mollusks to be found along the southwest coast of Florida between Cape Romano and Cape Sable. These two capes delimit the western edge of the Everglades, which, in this region, is fringed with mangroves for nearly its entire length, interspersed with few and not very large "high" islands that support the usual south Florida flora.

Many of the outer islands or keys, both mangrove and "high," are flanked with oyster bars and upon these bars the *Onchidium* were found crawling in considerable numbers. This little mollusk is very readily overlooked as it is shell-less, only 10–20 mm. in length, flattened, dark green in color and with a somewhat papillose surface. Its general appearance is like a small subcircular piece of sea-weed. They "nest" in the crevices created by the oyster shells and do most of their moving and feeding at low tide. As the tide covers the bars they seek protection within and between the dead oyster shells. More than 100 specimens were counted to the square yard at several localities, though generally, the count was much under this figure.

The following are records based upon specimens collected in 1931. Between Cape Romano and Shark River, however, they were noted at all places that we stopped, though specimens were

[1] The limits assigned to the distribution of this species in Johnson's list (1934) were based upon the material we collected in 1931. Exact localities are now given.

not always preserved: Tarpon Bay, Sanibel Island, Lee Co.; Horse Key, 11½ mi. S. E. of Marco, Collier Co.; small key, 7½ mi. N. N. W. of Lossman's River, Monroe Co.; Plover Key, 5 mi. N. N. W. of Lossman's River, Monroe Co.

This extends the northward range to Charlotte Harbor which is about 150 miles north of Knight's Key.

NOTES ON *ISCHNOCHITON OPHIODERMA* AND *MILNERIA KELSEYI*

BY FRED BAKER

A number of years ago I discovered that Dr. Dall had described *Ischnochiton ophioderma* from Panama in 1908[1] and had used the same name for a Panama specimen in 1920.[2] I wrote Dr. Dall suggesting a new name for the second species. I soon received an answer saying that, on comparing the two types, he found that he had described the same species twice, fortunately using the same name both times on account of the "snake skin" appearance of the specimens. It seems well to report this to prevent a new name being given to replace the second one.

Another report which it seems well to make for the convenience of workers on west coast shells concerns *Milneria minima* Dall and *Milneria kelseyi* Dall. The first was originally described as *Ceropsis minima.*[3] *Ceropsis* being preoccupied, the name was changed to *Milneria minima.*[4]

In describing *M. kelseyi,*[5] Dr. Dall remarked that it had been confused with *M. minima* and that it could be best described by using the two species for comparison. By a curious error he reversed his type specimens so that the description of *M. minima* is really the description of the new species. To read the descriptions correctly, one must reverse the names throughout the whole article.

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[1] Bull. Mus. Comp. Zoology, XLIII, 1908, No. 6, p. 356.
[2] Proc. U. S. Nat. Mus., LV, 1920, p. 506.
[3] Am. Jour. Conch. VII, 1871, p. 152, pl. 16, fig. 5.
[4] Proc. U. S. Nat. Mus., VIII, p. 549, pl. 24, figs. 5–7.
[5] Proc. U. S. Nat. Mus., LII, 1917, p. 408.

LAND SNAILS OF KADIAK

BY S. STILLMAN BERRY
Redlands, California

Published records of terrestrial Mollusca from southern Alaska are not numerous. Our distributional knowledge is extremely scanty over wide areas, hence the interest in any new contribution, however small. The ensuing notes derive from a series of specimens taken on Camp Island in Karluk Lake, Kadiak Island, Alaska, Sept. 2, 1935. I am indebted for the privilege of examining and reporting upon them to their collector, L. D. Townsend.

Haplotrema sp. One imperfect dead juvenal.

Euconulus fulvus alaskensis Pilsbry. 12 specimens. These seem to me to resemble the original figures of *alaskensis* much less than they do certain of Pilsbry's comparative figures of *fulvus* s.s. (Proc. Ac. Nat. Sc. Phila. 1910, p. 132, f. 26–27). However, I quite share Henderson's recently expressed inability (Univ. Colo. Stud. 23 (4) : 258, 1936) to effect a clear-cut separation of our western form of *fulvus* into two races as is repeatedly attempted in the literature. Certainly there is not the hiatus which Pilsbry's notes and figures might lead one to attempt to find between them. The lack of spiral striae stated as one attribute of *alaskensis* fails to hold even for all Alaskan specimens (*e.g.*, some collected for me by Dr. W. A. Hilton at Skagway) when subjected to sufficiently high magnifications. The question of these races and their distribution would bear a thorough reconsideration, keeping in mind not only the important consideration of microscopic sculpture, but the possibility that both height of shell and number of whorls may increase more rapidly than shell diameter with the approach of full maturity.

Pristiloma arcticum (Lehnert). 3 specimens.

Retinella binneyana occidentalis H. B. Baker. 1 specimen. The spiral striation is more obscure in this example than in the paratype of the subspecies kindly sent me by Dr. Baker, but it can be made out to some extent. So far as revealed by my search of the literature this constitutes a new record for the territory.

Discus cronkhitei (Newcomb). 9 specimens. All are small for the species if mature. I am continually more convinced that

an exhaustive analytical and zoogeographical overhauling of the entire *cronkhitei* series is an important desideratum.

Punctum conspectum (Bland). 9 specimens.

Vertigo modesta (Say). 3 specimens.

Vertigo modesta ultima Pilsbry. 1 mature specimen; a juvenal in the lot may be the same.

DISTRIBUTION OF FOSSIL OYSTERS OF HAWAII

BY J. M. OSTERGAARD

The giant fossil oyster, *Ostrea kamehameha* Pils., formerly known as *O. bryani* Pils., has to within the present time been known to occur only at the Waianae limestone quarry, from whence several complete specimens have been obtained.

This summer the two valves of an entire shell was found in cesspool digging at Kupikipikio, commonly known as Black Point, and located at the eastern side of Diamond Head crater. Upon examination of the limestone dug from the cesspool an entire valve and several fragments of this oyster was found among other fossil pelecypods and gastropods. Persons present during the digging of the cesspool stated that the limestone in which the oyster was found was immediately overlain by a ten-foot stratum of tuff, which in turn was covered by 30 feet of basaltic lava rock. The volcanic tuff belongs to Diamond Head crater, while the basalt overlying it has been ejected from Kupikipikio.

By examining the limestone sea cliff a few hundred feet away from the cesspool, I located at an elevation of about 15 feet above the sea a compact bed of *O. kamehameha* in which numerous specimens occurred firmly cemented into a solid mass. Since the limestone in which this oyster bed was found is free from both tuff and basalt detritus, it is evident that it antedates both Black Point and Diamond Head craters and that the oyster bed is part of that reached by the cesspool digging.

The two localities now known for *O. kamehameha* are about 30 miles apart, linear measurement, and the age is presumably late Pleistocene.

Another fossil oyster, *Ostrea retusa* "Pease" Sby., has been known only from the Pearl Harbor region of the island of Oahu,

where it has been found, (1) in the Waipio railroad cut, (2) between the middle and westerly lochs of the harbor and (3) on Ford Island—all of which localities lie within a radius of about five miles.

In the year 1926 in a sand pit excavation at the spur between Manoa and Palolo valleys an oyster conglomerate containing shells in abundance of this species was found associated with beach shells of the species now living. This was the innermost marine deposit on this part of the island and about two miles from the present shore line. This site is about 15 miles in linear measurement from the type locality of Waipio and the age appears to be late Pleistocene.

A NOTE ON THE FOSSIL MARINE FAUNA DREDGED FROM THE JAPANESE SEAS

BY SITIHEI NOMURA and KOTORA HATAI
Contribution from the Institute of Geology and Palaeontology, Tôhoku Imperial University, Sendai, Japan

The marine fauna inhabiting the seas surrounding Japan is gradually becoming well known through the extensive dredge operation and other oceanographical observations made by the *S.S. Sôyô-Maru* of the Imperial Fisheries Experimental Station at Tôkyô Fisheries Experimental Station at Tôkyô, the *SS. Hukui-Maru* of the Hukui Prefectural Fisheries Station, besides many other local fisheries stations, biological institutions, etc. However, although we have considerable knowledge, there remains much more room for further knowledge concerning the marine fauna of our waters.

Recently, this necessity for more knowledge was strongly felt as a result of many fossils being dredged from the seas of certain parts of Japan. Without further dredgings in shallow seas, we cannot expect to gain a full knowledge of our fauna.

In the present report we wish merely to state some of the interesting fossils known from the seas bordering Japan on the one hand and to state some of the interesting problems now facing us in this subject.

According to H. G. Richards,[1] the marine shells found on the "Banks" of North Carolina, comprise a fauna consisting of a large percentage of shells that appeared to be fossil. He says, "Many were very worn; others were black in color and resembled those often found on the New Jersey beaches and which were considered as having been washed from some nearby Pleistocene deposit."

The presence of certain Pliocene species on the "Banks" is explained by him as "The Pliocene (Waccamaw formation) is probably not very deeply burried near the shore line and it may form the sea bottom some miles off shore," and that the Pleistocene (Pamlico formation) probably extends seaward, dipping beneath the recent deposits of the sea floor. From the geographic distribution of the species collected, their state of preservation, relation to the geological formation of the adjoining district and mixed characters of the fauna, Richards concludes that "While it is undoubtedly true that many warm water species do occur near Cape Hatteras, it is probably that some of these records are based upon Pleistocene fossils found on the beaches," and that "it is desirable that living specimens be obtained when recording a new northern or southern limit for a species."

A questionable record for *Panomya arctica* Lamarck is given by R. A. McClean.[2] According to him, *P. arctica* was dredged dead from a newly charted canyon on the south side of George's Bank in 290–328 fathoms (40 21 N. 67 50 W). The known bathymetric range for this species is said to be 25–115 fathoms; thus the present record either extends the known range in depth or it was carried to this depth by a landslide of the substratum. However, H. Stetson is of the opinion that the recent mud in which it was found "rests on a clay, possibly Tertiary in age, which occurred at a comparable depth in another canyon."

It is hard to decide whether the dead shell obtained by them is a fossil or a recent one. Both authors have logical views, probably future dredgings will settle this problem.

W. H. Dall[3] records Upper Cretaceous fossils from the sea bot-

[1] H. G. RICHARDS; Some Shells from the North Carolina "Banks," NAUTILUS, *49*(4), 130–134, 1936.

[2] R. A. MCCLEAN; *Panomya arctica* Lamarck, NAUTILUS, *49*(1), 34–35, 1935.

[3] W. H. DALL; Tertiary Fossils Dredged off the Northeastern Coast of North America, Contri. Pal. Lab., Peabody Mus., published in Amer. Jour. Sci., *10*, 213–218, 1925.

tom of a depth of 200 fathoms off Banquereau, Nova Scotia; questionable Eocene fossils from George's Bank; Miocene, questionable Miocene, Pliocene, questionable Pliocene, and questionable Pleistocene fossil mollusca from the sea bottom of George's Bank.

Probably other such records are also found in literature of various countries. Probably more noteworthy than the records of fossils dredged in foreign waters is the profound fact that the Japanese waters, especially that of the Japan Sea, yields a large number of fossil vertebrates. In the following lines the records of some fossil marine animals are briefly given.

H. Niino[4] records from the sea bottom of the Tyôsen Strait the following species of fossils, namely: *Corbis civica* Yokoyama from depths of 73, 146 and 139 meters; *Pecten intuscostatus* Yokoyama from depths of 90, 99, 112, 139, 192, and 219 meters; *Pecten heteroglyptus* Yokoyama from 139 meters; *Poromya flexuosa* Yokoyama from 90 meters; *Thyasira bisecta* Conrad from 194 and 249 meters; *Lora yamanii* Yokoyama from 100 meters; *Turricula subdeclivis* Yokoyama and *Turbonilla morsei* Yokoyama from 130 meters; and *Carharius cuspidatus* (Agassiz) from 249 meters.

Of the fossils just mentioned, *Pecten heteroglyptus* is a characteristic Pliocene fossil first appearing in the Lower Miocene of Japan, extending its range upward to the Middle Pliocene. *Thyasira bisecta* is found in the Oligocene, Miocene and Pliocene of Japan where it makes several distinct faunal horizons of wide distribution; it is not yet known to be living in the waters surrounding Japan, although an isolated broken valve is reported from the Strait of Tyôsen (Korea). *Carcharius cuspidatus* is frequently met with in the Miocene of Japan.

Fossil marine mollusca, brachiopoda, foraminifera, diatoms and sponge spicules are widely distributed in the sea bottom of the Japan Sea,[5] extending from Hokkaidô at the north to the Strait

[4] H. NIINO; Fossil Localities in the Sea Bottom of the Tyôsen (Korea) Strait, Jour. Geol. Soc. Jap., *46*(546), 383–386, 1 pl., 1934 (Japanese).

[5] H. NIINO; On the Discovery of *Thyasira bisecta* CONRAD in the Sea Bottom of the Tyôsen Strait, Jour. Geol. Soc. Japan *41*(487), 176–182, 1934 (Japanese). Ditto, Bottom Material of Western Tugaru Strait, *ibid.*, *41* (495), 713–726, 1934 (Japanese). Ditto, On Soundings at Musasi-tai, Geogr. Rev. Japan, *12*(2), 85–95, 1936 (Japanese). Ditto, On Soundings from the Banks between the Oga Peninsula and Sado Island in the Northeastern Part of the Japan Sea, Jour. Imp. Fisher. Inst., *31*(1), 1935.

of Tyôsen at the south. Even the existence of a submerged forest is reported by M. Shimakura[6] at Uodu in Toyama prefecture. According to him, from the 90 samples of fossil woods from the submerged forest, "the submerged forest may be considered to be analogous to those now living in the southern part of the Temperate regions of Japan," and that "The forest, if it were in Akita district, grew on an eminence of more than 100 m. above the sea level."

The single dorsal valve of *Coptothyris grayi* (Davidson),[7] a brachiopod, once recorded from off Arakawa, Tiba Prefecture, in 23 meters, has the appearance of being a fossil. And now with other data at hand, we are of the opinion that it really is a fossil. From the same station was also found a single valve of *Pecten swiftii* Bernardi, encrusted with bryozoa on the inner side of the valve and with a solitary coral adhered to its outside; this also appears to be a real fossil. Further, soft gravels of calcareous sandy shale or calcareous fine sandstone containing fossil foraminifera belonging to *Quinqueloculina lamarckiana* d'Orbigny, *Globigerina inflata* d'Orbigny and *Eponides haigenbergii* d'Orbigny was recorded from the Banks of Senoumi in Suruga Bay by H. Niino.[8]

Besides the many fossil molluscan shells which are dredged from the sea bottom of the Japan Sea, there are also many fossil woods, brachiopoda, plant leaves, foraminifera with the probability of finding fossil corals and other preservable marine invertebrate animals. The fossil plant leaves once mentioned by H. NIINO are of considerable interest in the fact that closely similar ones are known from the Neogene Tertiary deposits of the adjacent region.

Of the many kinds of marine animals which are supposed to be fossils, probably the foraminifera present the most interesting and difficult problems. Firstly, because they are easily carried

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[6] M. SHIMAKURA; On the Woods of the Submerged Forest of Uodu, Toyama-Ken, Japan, Sci. Rep. Tôhoku Imp. Univ., Geol., *18*(3), 299–310, 1936.

[7] K. HATAI; A List of the Recent Brachiopoda Dredged from the Littoral Sea of the Pacific Side of Bôsô Peninsula, Central Japan, Rec. Ocean. Wk. Jap., *8*(1), 1–17, 1936.

[8] H. NIINO; On the Soundings from the Banks of Senoumi in the Bay of Suruga, Japan, Jour. Imp. Fisher. Inst., *29*(2), 69–91, 3 pls., 1934.

from the original place of habitat by waves, currents and other such oceanographical phenomena, or by landslides or submarine disturbances, to either deep water where they did not live or to shallower water. Secondly, since their living parts have not yet been discovered in the material dredged from the sea bottom of the Japan Sea, it is difficult to prove their existence in that region. Thirdly, merely the presence of polished shells, fresh appearance and mode of preservation are not sufficient data to prove their existence in that region, due to the fact that the Pliocene Byôritu Beds of Taiwan (Formosa), the Pleistocene Ryûkyû limestone formation of Kikai-zima in the Ryûkyû Island Ground, and several other localities in the Kwantô Region of Central Japan, yield fossil molluscan shells in such perfect preservation that not only the minutest detail of the sculpture is retained but also the original coloration is very often preserved; in fact, a large number of them are in a state of preservation exceeding those now found strewn along the beaches. Fourthly, because their soft parts are hard to obtain, even although there are reports dealing with the living foraminifera. Such minute creatures are easily carried to and fro by agencies including winds.

In fact, H. Niino[9] reported the occurrence of fossil foraminifera from Tosabae, a marine bank situated at the entrance of Kii Strait, 50 km. off the coast of Cape Muroto, Tosa Province, Sikoku, Japan. The rocks building up the bank are apparently the same as those building up the Neogene formation developed in Aki-gun, near Cape Muroto, where fossil foraminifera and mollusca are known to occur.[10] The description given by H. Niino brings to mind the "Banks" of North Carolina mentioned by Richards, although the Japanese one is submerged while the American one is above sea-level. If the relation between the bank and the mainland mentioned by Niino is similar to that of the North Carolina "Banks" to the mainland, *i.e.*, geologically, then it may be possible that we shall be able to find some fossil shells washed out from the Pliocene deposits of the coasts of near Cape Muroto in the recent fauna found strewn along the beaches

[9] H. NIINO; On the Soundings at Tosabae, Geogr. Rev. Japan, *11*(8), 679–687, 2 pls., 1935 (Japanese with English resume).

[10] M. YOKOYAMA; Pliocene Shells from Tonohama, Tosa, Rep. Imp. Geol. Surv. Japan, *104*, 9–17, 2 pls., 1929.

of Tosa Bay. This possibility is very great and probably we shall yet hear of records of fossils in the recent fauna there.

The very interesting article by W. H. TWENHOFEL[11] dealing with the problem of environment in sedimentation and stratigraphy, is of much value in dealing with the problem stated above, and without full consideration of his article, we believe that the palaeontologist as well as biologist will not arrive at accurate results in analyzing a marine fauna of doubtful fossils intermingled. Furthermore, in order to deal with the problem of palaeo-ecological conditions, difference in geographic distribution of living and fossil forms, or evolution of climatological conditions, we sincerely believe, and take this opportunity to state, that the four phases of environment as discussed by W. H. Twenhofel are not only most important, but should also be studied in the field[12] to the extent possible, to bring about conclusions worthy of scientific recognition. Mere assumptions without any sufficient data is not only a bad means of study but also one that does more harm than good.

The presence of fossils in the Japan Sea bottom is of interest not only from the view of the palaeontologist but also from that of the geologist. We have already submitted[13] a short note on the possible explanations to the fossil fauna of the Japan Sea. In short, we believe that the fossils are really those of the Pliocene Daisyaka Shell-beds which are widely distributed in Mutu province, a part of Northwest Ugo province, and in Sado Island, but not on the intermediate adjacent districts. The limited distribution in the region south of Oga Peninsula, its occurrence on Sado Island, wide distribution north of Oga Peninsula, together with the submarine topography and general distribution of the fossils in the Japan Sea lead us to believing that the fossils belong to no other than the Pliocene Daisyaka Shell-beds. These beds overlie the next older, Natukawa Shell-beds of Lower Pliocene

[11] W. H. TWENHOFEL; Environment in Sedimentation and Stratigraphy, Bull. Geol. Soc. America, *42*, 407–424, 1931.

[12] In regard to studies in the field relating to this subject, one of our papers is now in press; it is entitled "The Geologic Significance of the Recent Mollusca from Nagahama, near Isnomaki, Rikuzen Province, Japan." In it the four phases mentioned by W. H. TWENHOFEL are carefully studied and good examples are found in the field.

[13] To be published in Records of Oceanographic Works in Japan, 1937.

age; this latter mentioned beds cover extensive area in the region south of Oga Peninsula. Thus it seems that the presence of fossils in the Japan Sea and especially if they really belong to the Daisyaka Shell-beds are important data in dealing with the history of the Japan Sea on the one hand and form a basis of interesting comparative study of the marine fauna which consists of both living and fossil animals.

THE OCCURRENCE OF TETHYS WILLCOXI IN NEW ENGLAND WATERS, AND ANOTHER RECORD FOR THIS LOCALITY

BY DANIEL MERRIMAN
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Tethys willcoxi was originally described by Heilprin (1886) from Florida, and the members of this genus are most commonly found in tropical waters on the Atlantic coast. But there are occasional records of the species, *willcoxi,* from New England. These records are, however, comparatively rare, and in most cases consist of only one specimen. This fact indicates that the species can hardly be considered indigenous to that section of the coast, and it is more likely that its infrequent occurrence in the region is best accounted for by the proximity of the Gulf Stream. Thus in the Woods Hole and Marthas Vineyard area, where this current passes close by, and on which it may encroach more at certain seasons and in different years than in others, are found various tropical organisms which are completely out of their usual range and yet are carried there or materially assisted in their progress by the Gulf Stream. Tropical forms in northern waters but some distance away from the Woods Hole region are more difficult to account for. It must be assumed that individuals of this kind reached these latitudes with the aid of the Gulf Stream, and that they then migrated by themselves through abnormally cold waters or were perhaps helped along by smaller currents, so that they eventually arrived in such a locality. The present record for *Tethys willcoxi* is one of the few which belongs to this latter type.

Accounts of *Tethys willcoxi* in northern waters from the Woods Hole region are summarized by Sumner, Osburn, and Cole (1911) as follows:

"Katama Bay, October 31, 1900, 1 large specimen. . . . Buzzards Bay, near Woods Hole, October 11, 1906, 1 specimen (probably of this species) taken in a lobster-pot. During October, 1910, this mollusk was taken rather frequently throughout the waters of the region, one or more specimens being recorded from New Bedford, Westport, Buzzards Bay (near Woods Hole), Lamberts Cove, Tarpaulin Cove, Robinsons Hole, and Menemsha Bight. . . ."

Records from northern waters but *not* in the immediate vicinity of Woods Hole are much more rare. Sanford (1922) mentions one from Narragansett, R. I., in October, and Dr. Wesley R. Coe deposited in the Peabody Museum at Yale University a single specimen (No. 4755) sent to him from Plum Island, N. Y.; this individual was taken in October, 1921.

It is noteworthy that all the records of *Tethys willcoxi* in these latitudes are in October, and the present capture of this species is no exception. On October 25, 1936, the author was at Newport in connection with an investigation of the striped bass for the Connecticut State Board of Fisheries and Game. A specimen of *Tethys willcoxi* was taken at this time from one of Mr. Clifton L. Tallman's large floating fish traps which was located less than a mile offshore from the rocks east of Bailey's Beach.

The individual was a dark brown all over while alive, and it emitted large quantities of the typical Tyrean purple fluid from its mantle. After it had been preserved in formalin for a short while the purple fluid changed to a reddish hue, and the animal began to lose the coloration it had in life. The "greenish" tints and "coarsely cloud-marbled" condition described by Pilsbry (1896) had appeared in three weeks. At this time the foot had turned noticeably lighter, while the edges of the pleuropodia or swimming-lobes, part of the mantle, and the head region were definitely olive-green. The inside of the pleuropodia retained their original dark coloration, with a distinct purple tint which probably came from the fluid the animal emitted while still alive.

The size of the specimen—measurements taken three weeks after preservation—was as follows: length, 10 cms.; height, 7.3 cms.; width, 6 cms. The shell was 56 mm. long and 43 mm. wide.

This individual has been given to the Bingham Oceanographic Laboratory, and is deposited in the Peabody Museum at Yale University.

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THE WEST VIRGINIAN PUPILLIDAE IN THE CARNEGIE MUSEUM

BY STANLEY TRUMAN BROOKS

Through the collections of Mr. Gordon M. Kutchka, of this laboratory, Mr. Neil D. Richmond, of Fairmont, Professor G. R. Hunt, Fairmont Teachers College, Professor M. S. Briscoe, Storer College, Harpers Ferry, and Mr. Paul Ridgeway, Ridgeway, West Virginia, 199 records have been added to the list published by me in March, 1935 (Annals of the Carnegie Museum, Vol. XXIV, pp. 61–68). Among these one new species was found and described (l.c. Vol. XXV, p. 121) and 18 species and two genera new to the state were added.

The collections were mainly from siftings of forest loam and debris. Fifty large samples were collected by Mr. Kutchka and ten by Mr. Richmond. Mr. Hunt and Mr. Briscoe made their own collections and submitted the cleaned specimens. All in all our collecting has been quite exhaustive in the areas studied, but many of the western counties remain to be investigated. Additional records or siftings from other collectors are welcome.

Gastrocopta pentodon	Common	39	records	in	17	counties
" *tappaniana*	?	7	"	in	4	"
" *procera*	Scarce	12	"	in	1	"
" *holzingeri*	?	1	"	in	1	"
" *holzingeri agna*	?	1	"	in	1	"
" *armifera*	?	32	"	in	5	"
" *contracta*	Common	42	"	in	13	"
" *corticaria*	?	8	"	in	4	"
Pupoides marginatus	?	20	"	in	4	"
Columella edentula	?	9	"	in	6	"
Vertigo gouldii	Common	11	"	in	8	"
" *ovata*	Scarce	3	"	in	3	"
" *milium*	"	2	"	in	2	"
" *oscariana*	?	4	"	in	4	"
" *clappi*	?	3	"	in	3	"
" *morsei*	?	1	"	in	1	"
" *tridentata*	?	1	"	in	1	"
" *elatior*	?	1	"	in	1	"

Gastrocopta pentodon gracilis and *Gastrocopta armifera clappi* are found in few localities associated with the typical forms.

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BY ARTHUR F. GRAY

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4. Descriptions of Terrestrial Shells of North America. By Thomas Say. Philadelphia, 1856, 12 mo., pp. 46, 1 plate. (Here Mr. Binney has brought together Mr. Say's scattered papers and generally inaccessible writings, particularly those relating to our terrestrial species.)

5. Descriptions of American Land Shells. Proc. Acad. Nat. Sci. Philadelphia, Feb., 1857, pp. 18–19. (*Helix intercisa, H. Nickliniana* var., and *Succinea lineata* described.) Also published separately.

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17. A Supplement to the "Terrestrial Mollusks of the United States, &c." Boston Journal of Natural History, Vol. VII, No. 1, pp. 1–207, with 6 plates. (The plates in Nos. 16 and 17 are numbered in continuation of those in the third volume of the "Terrestrial Mollusks" by Dr. Amos Binney, as these papers form a continuation of that work.)

18. I. Remarks on a species of Leda. II. Notes on the Geographical Distribution of N. A. Terrestrial and Fluviatile Gasteropods, Proc. Acad. Nat. Sci. Philadelphia, Feb., 1860, pp. 49–50. (II. Also published separately.)

19. Notes on American Land Shells, No. 6. Proc. Acad. Nat. Sci. Philadelphia, May, 1860, pp. 150–154. (This list contains all species then described as inhabiting Mexico.)

20. Descriptions of New Species of Pulmonata in the Collection of the Smithsonian Institution, Proc. Acad. Nat. Sci. Philadelphia, May, 1860, p. 154. (*Pedipes lirata* and *Onchidium Carpenteri* are here described.)

21. Catalogue of the Terrestrial and Fluviatile Gasteropods inhabiting the Continent of North America, from Smithsonian Miscellaneous Collections. Distributed, in form of proof about 1860, pp. 15.

(*To be continued*)

NOTES AND NEWS

Marquis de Gregorio's Claiborne Types.—It may be of interest to Tertiary paleontologists to know that the type and figured specimens of the Eocene species described by the late Marquis Antoine De Gregorio in "Monographie de la Faune Éocénique de l'Alabama," Annales Geol. et Pal., 7 et 8 liv., 1890, are in the De Gregorio home, Via Molo 132, Palermo, Italy. This information was gained through correspondence with Prof. Dott. Ramira Fabiani, Direttore dell'Istituto e Museo di Geologia della R. Università di Palermo, Palermo, Italy, and Rosalia De Gregorio, daughter of the Marquis.—K. Palmer, Paleontological Research Institution, Ithaca, N. Y.

Arion circumscriptus Johnston.—A new record for Western New York Mollusca is that of *Arion circumscriptus* Johnston, discovered in my yard in Buffum Street, Buffalo. Four specimens were taken on September 28th as the result of a search inspired by Mr. A. La Rocque's suspicion that the range of this species is much greater than that hitherto known. These specimens have been deposited in the Buffalo Museum of Science.—Imogene C. Robertson.

Turbonilla (Pyrgiscus) delmontana, *new name*.—Miss A. Myra Keen has called my attention to the fact that *Turbonilla*

(*Pyrgiscus*) *delmontensis* Bartsch (1927 Proceedings U. S. National Museum, vol. 70, art. 11, pp. 9 and 10, pl. 2, fig. 11) is preoccupied by *Turbonilla* (*Turbonilla*) *gilli delmontensis* Bartsch (1907 Proceedings U. S. National Museum, vol. 33, p. 494, pl. 44, fig. 7). I therefore now propose for it the name *Turbonilla* (*Pyrgiscus*) *delmontana*.—PAUL BARTSCH.

OREOHELIX STRIGOSA CAPAX.—This name is proposed for the capacious form taken near McCammon, Idaho, noticed by Henderson and Daniels in Proc. A. N. S. Phila. 1916, p. 338, as *O. s. depressa;* also 1917, p. 54. Type is 112865 ANSP.—H. A. PILSBRY and J. HENDERSON.

ARE THE CONODONTS MOLLUSCAN TEETH?—The tiny tooth-like fossils known as conodonts are discussed by Prof. F. B. Loomis in Journ. of Paleontology, Oct. 1936, p. 663, who argues that they are radular teeth of gastropods. The closest similarity is to rachiglossate teeth. So far as I know, gastropods of families having this type of radula did not appear until some time in the Mesozoic. The known conodonts are all Paleozoic, when the sea snails had, presumably, radulae with the rhipidoglossate and taenioglossate forms of teeth, which do not resemble conodonts closely. Some conodonts resemble certain cephalopod teeth.—H. A. P.

BUCCINUM BAERI MORCHIANUM (FISCHER) NOT A TENABLE NAME.—In 1858 Dunker (Novitates Conchologicae, Mollusca Marina, part 1, pp. 2–3, figs. 2–3) used the name *Buccinum mörchianum* for what appears to be a form of *B. glaciale* Linn., apparently the same as the one later (1919) named *B. g. parallelum* by Dr. Dall. That Dunker's name was really published in the year 1858 seems certain. Not only was it in part one of the volume which, according to the title-page, ran from 1858 to 1870, but the appearance of the first two parts of this work was announced on pages 202–203 of the Journal de Conchyliologie for October, 1858.

In 1859 Fischer (Journal de Conchyliologie, vol. 7, p. 299) used the name *Volutharpa mörchiana* for a mollusk apparently a form of *Buccinum baeri* (Middendorff, 1848). Dr. Dall used

Fischer's name as of 1858, probably because volume 7 of the Journal (as a whole) was so dated. The fact is, however, that the part in which Fischer's name appeared was dated March, 1859.

From the above it appears clear that *B. mörchianum* Dunker has priority over *B. mörchianum* (Fischer) and should be used for the carinated form of *B. glaciale,* now known as *parallelum* Dall. This leaves the smooth form of *B. baeri* without a name, which is probably entirely fitting, as a large series of specimens of *B. baeri* in the writer's collection indicate that shape of shell, and presence or absence of sculpture in this species are individual characters and have no significance geographically.

Mrs. I. S. Oldroyd (Stanford Univ. Publ. Geol. Sci., vol. 2, part 1, p. 258) followed Dr. Dall in the use of the name *mörchianum* (Fischer). In her plate 27, however, the two figures supposed to represent this form are really *B. g. mörchianum* Dunker. This plate is further complicated by the fact that the numbers on the *Buccinum* figures and those on two figures of *Chrysodomus saturus* Martyn are transposed.—G. Willett, Los Angeles Museum.

Notes On Anomia aculeata Müller.—*Anomia aculeata* Müller was recently brought up in the dredge by the ketch "Atlantis" of the Woods Hole Oceanographic Institution from two stations, both of which were from greater depths than the maximum depth of 80 fathoms given for the species in Johnson's "Mollusca of the Atlantic Coast." Both stations were on Georges Bank; the first, N. 40° 23′, W. 67° 39′, tow 20, at a depth of from 350–155 fathoms; the second was (Corsair Gorge) N. 41° 21′, W. 66° 08′, tow 23, in a depth of from 271–130 fathoms. The specimens were brought up attached to shells during the latter part of July, 1936, by W. E. Schevill and H. Stetson.

One specimen from the former station had unusually long spines. There appears to be considerable variation in the development of the spines of this species. Many specimens assume the structure of a "corrugated roof," as figured in Gould-Binney, while in others the structures are raised at a right-angle from the plane of the shell, and directed away from the umbo. One specimen in the collection of the Museum of Comparative Zoölogy has

the spines represented as raised ridges radiating at regular, well-spaced intervals from the umbo to the margin of the valve, while another has the minute spines arranged in a very close-set order. Occasionally the spines occur only on the outer edges of the shell; however, more frequently the entire upper valve is profusely covered with the projections.—Richard W. Foster.

Conus mus Hwass., in Lake Worth, Florida.—On the first day of June 1936 Mrs. Lyman and I started on our usual collecting trip for the day. This was to our favorite *Pecten* (*Euvola*) *ziczac* grounds. Upon arriving at the beach and viewing the ocean we were so thrilled over the calmness and clearness of the water that we changed our plans. We decided to inspect some rocks at another point on the coast, rocks inaccessible except in extremely calm weather. We would look for *Cyphoma gibbosa* instead. It had long been our desire to find *Cyphoma gibbosa* in numbers. So we headed for these rocks. The tide was extremely low. Out I went with my water-glass and the usual spear for protection from octopus, shark, and the dreaded barracuda. *Cyphoma gibbosa* should be living on gorgonias growing on these rocks. My fellow-collector followed, investigating every nook and crevice as she went along in three feet of water. Soon I began noticing some very small coral formations of a porous nature. Having investigated such formations many time and at many localities it was mere persistence and curiosity that caused me to turn over just one more such head of coral. As they have many cavities and worm tunnels I was never able to understand why there were so few living shells in them. Imagine my surprise when upon turning over the first piece of coral I found two living *Conus mus*. Ye Old Tymers, Hear Me! You fellows who have made great finds. *The Next Coral Hid Three.*

Mrs. Lyman was immediately called. She came in a hurry out to my depth of water which was about five feet. Instantly, as soon as she heard the news, she turned a coral rock. Three living *Conus mus* were under it. Knowing all Conus are reputed to be poison if they stick their fangs into one I went to the car for my dip-nets, and we began taking these rare specimens. The tide was changing. The water came in fast. The breakers

started. We paid little attention to these handicaps. Hanging onto the water glasses, turning every specimen of this particular coral, we continued to look for these much desired *Conus mus.* We forgot all about sharks even though one had been harpooned that day at the spot. We were getting *living* Conus in numbers!

One hour of this was all the waves and tide would let us stand. We went ashore and counted our catch. We each "believe it or not," had taken exactly the same number, 78 each. One hundred fifty-six living adult sized *Conus mus* in one hour. Do you wonder that we forgot entirely the matter of collecting *Cyphoma gibbosa?*

This was truly a great find. Too good to keep from our fellow collectors Miss Stella Cooper and Capt. Will E. Poland. We could hardly wait to drive up to tell them of our good fortune. Like all ambitious collectors we had to have some fun so I put fifteen *Conus mus* into one bottle with alcohol. These fifteen had been found under one rock. The remaining one hundred forty-one I put into another glass container. Thus armed for some fun we motored to Miss Cooper's home. "Captain Bill" was there. The fifteen specimens were proudly exhibited to him. Little difficulty was experienced in getting Capt. Poland to agree to drop his work and go with me the next day for *Cyphoma gibbosa* and at the same time to take some *Conus* for him. The 141 cones were not necessary to bait him up, but they came near to compelling me to then and there buy lighting equipment and to go with Capt. Bill for a search on the night low tide. He saw our great catch, yet could hardly believe his sight to be true. To take that many *Conus mus* in Florida is enough to make any one pinch himself. *Truly This Was a Great Day!*—Frank B. Lyman, Lantana, Florida.

A Mussel Taken From the Stomach of *Rana catesbiana* Shaw.—Among a series of unaccessed duplicates in the Bryant Walker collection, a specimen of *Carunculina texasensis* (Lea) was found that, according to the label, was recovered by H. E. Hubert from the stomach of a large *Rana catesbiana* Shaw from Louisiana. The mussel has the following dimensions: length 40 mm., height 25 mm., diameter 18 mm. Although *C. texasensis*

is not considered a large mussel, it is surprising that this frog would have utilized it as a part of its diet. The writer has no knowledge that such frogs are to be considered among mussel predators, and consequently considers this observation worthy of being recorded. Often the parasitologist is faced with the problem of what eats what, and, as in this case, we are at times astounded by what such stomach examinations reveal.—HENRY VAN DER SCHALIE.

LAMPSILIS CARIOSA (Say).—Through the kindness of Mr. John H. Huntington we are indebted for a fine series of *Lampsilis cariosa* which he had collected in the Connecticut River at Hadley, Massachusetts. All of the specimens were recently dead, probably killed during the floods of early spring. They had evidently been washed up from the deeper waters of the river onto a sand bar and became exposed during the low water stage of the river in September.

Certain of these specimens are larger than any record for this species. In addition to our measured specimens, we give the largest recorded by Ortmann (1919, Mem. Carnegie Mus. 8, no. 1, p. 315) and Simpson (1914, Descriptive Catalogue of the Naiades, p. 44).

	Length	Height	Diameter	
Male	122	80	50 mm.	Selinsgrove, Pa. (Ortmann)
Male	113	74	41	Duncannon, Pa. (Ortmann)
Male (?)	120	80	45	No locality (Simpson)
Male	130	85	50.5	Hadley, Massachusetts
Male	130.5	81.5	52.5	Hadley, Massachusetts
Male	124	75.5	49.5	Hadley, Massachusetts
Female	96	71	44	York Haven, Pa. (Ortmann)
Female	122	91	56	Hadley, Massachusetts
Female	115	85.5	52.5	Hadley, Massachusetts
Female	108.5	83.5	50	Hadley, Massachusetts

—W. J. CLENCH and H. VANDER SCHALIE.

KLAMATH COUNTY, CALIFORNIA.—This county was mentioned occasionally in the early literature of Californian mollusks. Thus, in Binney and Bland, Land and Freshwater shells of N. A., page 134, the range of *Polygyra loricata* is given as "California, near San Francisco to Klamath Co." As the county cannot be

found on modern maps, the name may perplex those working on distribution. I first heard of it in a Eureka newspaper. I consulted Dr. W. O. Gregg about it and he dug up the following information, compended from "California County Boundries," pages 123 to 126, by Owen C. Coy (published by the California Historical Commission, Berkeley, 1923).

Klamath bears the unenviable distinction of being the only county of the state which has completely disappeared. Many other counties were never organized, although they have been created by law, but no other county having once been organized, has ceased to exist as a political unit. Klamath County was created April 25th, 1851, and was dissolved under an act passed March 28, 1874.

Its original territory may briefly be described as composing that part of the state lying north of a line drawn east from the mouth of the Mad River and west of the summit of the Coast Range Mountains.

There were several changes in its boundaries during its existence. The change of particular interest to zoogeographers was the separation of the area lying, roughly speaking, north of the mouth of the Klamath River into the newly created Del Norte County in 1857.

Klamath County never flourished; its territory was badly cut up into isolated districts by mountain ranges; and its population, mostly miners, lacked the stability necessary for a well organized government. Furthermore they did not possess property which could be easily drawn on for the support of the government. The natural result was that the debt of the county increased rapidly, the government became less efficient, and discontent among the people rose in like proportion. In 1874 an act was passed whereby the county was to be dissolved, the debt and territory to be divided between the neighboring counties.—E. P. Chace.

A Correction.—In my recent article on Pectinidae (Nautilus, vol. 50, No. 1, pp. 24–27, July, 1936) there is an error in the placing of some footnote material which may be confusing. In the fourth paragraph, page 25, footnote 3 is indicated after "*Felipes* (Locard) Carus[3] —." The paragraph which followed, begin-

ning "Mr. Thomas Cowles—" and ending "—with *P. pesfelis* L. as the type," should be a part of the footnote and not the text.—L. G. HERTLEIN.

ERRATA.—By a printer's error, carelessly overlooked in proof-reading, in NAUTILUS for October, p. 65, the Lowe collection was said to be given to the *San Francisco* Society of Natural History. The copy read *San Diego*. Similarly on p. 67 the Boston Club was said to have a field excursion from Worcester to Cape Ann. This would make a long day: Gloucester being as the copy had it.

PUBLICATIONS RECEIVED

GONIOBASIS OF THE COOSA RIVER, ALABAMA. By Calvin Goodrich. Univ. Mich. Mus. Zool., Misc. Pub. 31. In this third paper discussing Coosa River pleurocerids the stout, cylindric Goniobases are revised. This group has been the terror of conchologists for a generation. Though a few, such as *capillaris, impressa* and *caelatura* were generally recognized, most of the species were submerged in such a sea of synonyms, about 90 in all, that one sank back discouraged by the task of identification. 24 species are now admitted, three of them new, two other names substituted for names preoccupied. The opercula and dentition are considered, and all of the species are illustrated by excellent line figures. The following general conclusions are reached:

"The colonies in which the least shell variation is shown are those at the very head of the Alabama River system and those at the end of the range of Pleuroceridae in the system. This is in keeping with findings in other drainage basins.

"The alteration from a conic shape to a cylindrical shape occurs at an earlier stage in riverine species than where these species invade tributary streams. In other words, this kind of acceleration is at a faster rate in the river than in the creeks.

"Plicate sculpture is more marked in creek forms than in river forms, persisting also for a greater number of whorls. A tendency is observable of a reduction or loss of striate sculpture in striate species that enter the creeks from the river.

"Elliptical or elongate-ovate apertures are the mark of riverine forms rather than of creek forms, among which ovate apertures are the rule.

"The penetration of riverine pleurocerids into the creeks is farthest in those small streams which have most nearly worn down to grade, such creeks in their lower parts approaching the stage of river estuaries.

"No definite rule as to the occurrence of color bands in reference to position in stream could be noted among the goniobases of the Coosa and Alabama rivers. There does appear to be such a rule among shells of small tributaries, color banding increases in a downstream direction.

"Hard and fast distinctions as between some of the species is impossible."—H. A. P.

The Land Mollusca of Cheboygan County, Michigan. By A. F. Archer. Uni. of Mich. Mus. of Zool. pub. no. 340, Aug., 1936.—Thirty species are listed as occurring in this county of Michigan. This paper is far more than a list of the species as it deals with the ecology of the region and the plant associations that make up the habitats where the mollusks are found.—W. J. Clench.

Pyramidellidae from Siogama Bay, Northeast Honsyû, Japan, by Sitihei Nomura. Saito Ho-on Kai Museum Research Bull. No. 10, August, 1936, pp. 1–108, pls. I–XII. In this monograph 79 new species of pyramidellid gastropods are described. One new subgenus is proposed: *Tropaeas* (Siogamaia) (p. 49), type *T.* (*S.*) *fortiplicata* Nomura (n. sp.); two new sections also are proposed: Marginodostomia (pp. 11, 34), type *Odostomia suturamarginata* Nomura (n. sp.) and Pseudocingulina (p. 11), type *Cingulina triarata* Pilsbry [recorded on p. 47 as "*Paracigulina* (sic) new section, type: *Turbonilla* (*Cingulina*) *triarata* Pilsbry"; since these two names are obviously synonymous, *Pseudocingulina* should be given preference on the basis of page-precedence]. A tabular review of seven previous classifications of the family Pyramidellidae is included in the paper.—Myra Keen.

LIBRARY

THE NAUTILUS

Vol. 50 April, 1937 No. 4

SECONDARY SEX ORGANS AND TAXONOMY IN THE NERITIDAE

BY E. A. ANDREWS

The grouping of snails within the family Neritidae has been based chiefly upon the characters of shell and of radula. However Bourne discovered in the several species that he studied that there were some anatomical differences within the family. Thus *Septaria* and *Neritina* agree in having both a coelomic funnel on the oviduct and also a *ductus enigmaticus,* while Nerita has the funnel but lacks the *ductus,* whereas *Theodoxus* lacks both funnel and *ductus.* That is, *Septaria* and *Neritina* are more alike while *Theodoxus* is a step farther than *Nerita* in the direction of diminished number of organs considered.

The present author has studied the secondary sex organs on the head of males and females and also the spermatophores and their organs for storage, as well as the contrivances for storage of mineral particles to be used by the females to add to the secreted capsules, within which the eggs undergo development.

Spermatophores are found stored up in many females during long periods and thus are to be found in museum specimens.

The detailed facts and the illustrations will appear elsewhere but some of the applications to the systematics of this family will be considered here. Though there are hundreds of species in this family the examination of but thirty may yet have significance since these species were taken at random and include seven genera of the nine recognized by Thiele (1929) and all the three subfamilies recognized by Baker (1923).

On attempting to fit the new facts into the accepted classification we at first meet with agreeable harmony. Thus *Neritilia succinea* differs much from the others: in the absence of both male and female head organs and of reinforcement sac (though

the capsule bears sand particles); in the absence of specialized anatomical connection of anus and ootype mouth though both are close together; and in the presence of long, slender, simple, tubular spermatophores. This is in harmony with the isolation given *Neritilia* by both Baker and by Thiele. Next *Smaragdia viridis* is set off as having anus and ootype separate and spermatophores slender tubes, in simplicity such as in *Neritilia*. But on the other hand it has a reinforcement sac (thus far found empty) as well as a female ridge and large male organ comparable to those of species of *Neritina*. On these accounts it might well be isolated as a separate subfamily, as done by Baker, or on the other hand, included with the other Neritinae, as done by Thiele.

When, however, we come to the subfamily, Neritinae, there is difficulty in putting new wine into old bottles and some new bottles may be needed. Thus *Nerita* in place of leading off from *Theodoxus* to form with it a division, *Neritae,* separated from the other genera, *Septaria, Neritina, Neritodryas* and *Pseudonerita,* seems to stand by itself, in having no female ridge; a simple straightforward male organ; only spherulites as contents of the reinforcement sac; no intimate union of anus and ootype mouth; rather uniform spermatophores of spindle form, with one coiled off end and one long open filament, as well as a spiral about its body and no triods; and in having a simple spermatophore-sac for temporary holding of spermatophores that may be cast out. Many of these features of *Nerita* are those of comparative simplicity and if regarded as primitive and not as secondary would tend to set off *Nerita* as a lower, more primitive form than *Neritina* or *Theodoxus* and not to be joined to *Theodoxus* in one group as done by Baker.

The other genera studied, *Neritina, Theodoxus, Septaria* and *Neritodryas* agree with one another and with the very exceptional *Nerita alticola* and *N. pupa,* in presenting: close fusion of anus and oviduct mouth; sand, or other foreign solids, in the reinforcement sac; transverse position and more or less elongation of the male head organ; presence of a female headridge; and specialization of the fundus of the vagina to form a lateral sac, in which spermatophores are held and digested. Yet in spermatophore form they differ much among themselves. *Neritina* often has

long loops with triods. *Theodoxus* has shorter loops but has also very short sac-like forms.

Nerita pupa appears to have short sacs like those of some *Theodoxus,* while *Nerita alticola* has a short sac with unique prolongations. The peculiarities of *Nerita alticola* and of *Nerita pupa* separate them from other *Nerita* and affiliate them with the *Neritina-Theodoxus* group so that, from the present point of view, they seem not in the genus *Nerita* at all. Their aloofness from other groups of *Nerita* is already recognized in placing them in the subgenera *Fluvinerita* and *Puperita.* In describing *N. alticola,* Pilsbry recognized its resemblances to other genera but concluded that on radular characters it should be a *Nerita.* Also *Nerita pupa* has some outward resemblance to *Neritina* and Baker says "it has remained in *Neritina* for over a century." It seems an error to have put it in *Nerita,* since from the sex organs it appears nearer to *Theodoxus;* and the same may be said of *Nerita alticola.*

It was shown that in the Neritidae the spermatophores, as far as known, may be grouped as simple long tubes, very long loops, shorter loops, spindles, and short sacs; and some of them have spirals and others have triods.

It is recognized that both spirals and triods are often difficult to observe in preserved material and here their apparent absence may be of no value in placing specimens, but when found they seem good characters. How would a grouping of snails of this family based upon spermatophores agree with one based upon radula characters?

Baker starts with the radula of *Neritina reclivata* as primitive type in the Neritidae. *Neritodryas* and *Pseudonerita* he regards as isolated. From *Vitta* he leads off *Neripteron, Vittina, Neritina* s.s. *Neritona* all on one branch, while the other branch would be *Clithon* s.s. *Alinoclithon, Neritoclithon, Theodoxus* s.s., leading to *Nerita.*

For the most part the spermatophores known fall well into this classification. Thus the specialized loop of *Vitta* is represented by loops in *Neripteron, Vittina, Neritina* s.s. and *Neritona* and they bear triods in *Vitta, Vittina,* and probably also in *Neritina* s.s. However *Neripteron* as represented by *Neritina vespertina*

has a spiral, as in *Nerita.* Then on the other branch, the spermatophore in *Clithon* has a very short sac-body with a shorter and a longer filament. This in *Vittoclithon* becomes apparently a mere sac, and this appears again in *Theodoxus* s.s. However *Alinoclithon* as represented by *Theodoxus cariosus* has a loop with a spiral, as in *Nerita.*

Thus the two lines of Baker based upon radula characters are also two lines as based upon spermatophore characters; loops in *Neritina* and sacs in *Theodoxus:* except that there are two species with spirals, one in each group, *Neripteron* and *Alinoclithon,* as represented by *Neritina vespertina* and *Theodoxus cariosus.* Although these two species stand in widely separated genera they resemble one another in that they have "somewhat similar shell form" (Baker); have spermatophores strikingly alike; and have male head organs very much alike and more complicated than in other species as far as known. The specimens used were taken together in an artificial fish pond close to the ocean, in Hawaii.

These two exceptional species form, as it were, a group by themselves and raise many questions. May it be that the expanded form of shell necessitates a more complex male organ? That shell form and male organ may be correlated is suggested by the conditions in Septaria and in *Theodoxus souleyetana* and *Th. madacassina* of the group *Clithon* in which some species may have spines over the outside of the shell which might necessitate elongated organs. Unfortunately there are no observations upon the handling of spermatophores in transit from male to female, but it may well be that one snail crawls upon the shell of the other and that the smoothness and thickness of shell as well as its slopes are of importance in enabling the organs to connect with one another.

If on the foundation of scanty facts yet known we were to fancy a family tree for the family Neritidae it would closely resemble in its branchings the grouping arrived at by Baker and followed by Thiele. The chief differences would be the isolation of *Nerita* and the emphasis placed upon the bastard nature of the so-called *Nerita alticola* and *Nerita pupa.* Also *Neritina virginea* would be on some accounts, *e.g.,* spermatophores, a highly evolved and not the primitive form that it appears to be from its radula.

Such a tree seen as a few top branches should have a very low branch for *Neritilia,* a somewhat higher one for *Smaragdia,* a separate old branch for *Nerita* and higher branches for *Neritodryas, Septaria, Theodoxus* and *Neritina.* Concealed amidst the top twigs of *Nerita* there might be branches known as *Nerita alticola* and *Nerita pupa* which in reality arose as "water shoots" from the bases of *Theodoxus* and *Neritina* branches and not from *Nerita.*

In time such a tree if well pruned and tended might represent a harmonious expression of facts known as to general anatomy, secondary sex organs, shell form, operculum characters and radula details in this family, Neritidae.

MOLLUSCA FROM PRINCE ALBERT NATIONAL PARK, SASKATCHEWAN

BY FRANK C. BAKER

The portion of Canada known as Saskatchewan is little known conchologically and additions to our knowledge of the mollusk fauna of this region are greatly to be desired. With the exception of two or three papers the only references to this region are contained in general papers on Canadian Mollusca or in descriptions of new species. During the summer of 1936, Professor T. D. A. Cockerell, of the University of Colorado, made a collection of Mollusca from several of the lakes in Prince Albert National Park near the center of Saskatchewan, at about 54 degrees of latitude. Professor Cockerell requested the writer to prepare a list of the species represented and the following lists indicates that the collection is unusually extensive.

Nine species of land mollusks and 21 species of aquatic mollusks are contained in the collection. The fauna is characteristically that of the northern part of the United States and southern Canada, quite different from the molluscan fauna of the Rocky Mountain region. It is more eastern than western, a feature also noted among certain insects and arachnids collected (see Cockerell, Canadian Ent., 68, p. 85, 1936). The avian and mammalian faunas are also of this nature. The land snails are such as are common in the northern part of the United States, all of

the species being recorded from northern Minnesota. The aquatic fauna contains several species apparently peculiar to Canada east of the Rocky Mountains previously known from Alberta and southern Saskatchewan. Thus *Stagnicola johnsoni* is known from parts of Alberta. The presence of *Gyraulus hornensis,* a recently described Canadian species, is also noteworthy. The record of *Helisoma infracarinatum* also indicates a wide range of this recently recognized species. Some other species are equally interesting from a distributional standpoint. Prince Albert Park lies mostly in the Canadian zone and the molluscan fauna is typical of this climatic division.

Little work has been done on the Mollusca of this region and rich results await the naturalist who can collect material from the many lakes in northern Saskatchewan. Studies such as were conducted on Oneida Lake, N. Y., and Winnebago Lake, Wis., would be of the greatest interest. Dredgings in these lakes are highly desirable as well as careful littoral collecting. The Canadian conchologists have a rich field for their labors. The collection of Professor Cockerell is the largest single lot of molluscan material seen from this interesting region. The writer wishes to express his thanks to Professor Cockerell for the privilege of working up this interesting material and to Dr. Wm. J. Clench, of the Museum of Comparative Zoology, Harvard University, for the identification of the Physae.

Anodonta kennicottii Lea. Ajawaan Lake, adult and immature. All of the specimens of this species are characterized by a corneous or yellowish shell.

Pisidium species. Ajawaan Lake; Waskesiu Lake; Waskesiu Lake at Heart Lakes Portage; south end Crean Lake. At least four species are represented but it seems unwise to attach names to them. It is unfortunate that no one has taken the place of Dr. V. Sterki in the study of these interesting but difficult mollusks.

Valvata tricarinata (Say). Waskesiu Lake; Waskesiu Lake at Heart Lakes Portage; south end Crean Lake. Typical form with three well defined, sharp keels.

Valvata sincera Say. Waskesiu Lake and Waskesiu Lake at Heart Lakes Portage. These specimens agree well with examples

from High Island Harbor, Lake Michigan, identified as *sincera* by Dr. Bryant Walker. The Heart Lakes Portage specimens are a trifle more depressed but have the same general form and sculpture.

Amnicola limosa porata Say. Waskesiu Lake and Waskesiu Lake at Heart Lakes Portage. There is great variation in the form called *porata,* from the central west and Canada, and it is quite likely that one or more races may be separated when a careful study is made of abundant material covering a wide area.

Lymnaea stagnalis lillianae F. C. Baker. Waskesiu Lake; Ajawaan Lake; Crean Lake; Waskesiu Lake at Heart Lakes Portage. The large *stagnalis* of the Park is referable to this race rather than to *wasatchensis* Hemphill which occurs in lakes in Alberta, particularly in Wainwright Park.

Stagnicola palustris elodes (Say). Waskesiu Lake; Kingsman Lake; Crean Lake. The *palustris* of the Park are nearer the *elodes* form than the *nuttalliana* form, although the latter is found abundantly in Alberta in Wainwright Park. The Prince Albert Park specimens may be considered transitory forms between the eastern and western race.

Stagnicola johnsoni F. C. Baker. Ajawaan Lake. The single specimen in the collection resembles specimens from Banff, Alberta, referred to *Lymnaea traskii* Tryon in the Lymnaeidae monographs (see plate 39, fig. 10 of that work). It is larger than any specimen seen, measuring 26 mm. in length and 14 mm. in width. The Alberta reference to *traskii* was erroneous, that species not being found east of the Rocky Mountains. *Johnsoni* was described in the Canadian Field-Nat., 48, p. 69, 1934. This species is probably widely distributed in central Canada.

Fossaria obrussa decampi (Streng). Crean Lake, typical in form but small in size.

Helisoma anceps sayi (F. C. Baker). Waskesiu Lake; Waskesiu Lake; Waskesiu Lake at Heart Lakes Portage; Crean Lake. This race of *anceps* is apparently common in the lakes of the Park. The Heart Lakes Portage specimens are especially large and fine.

Helisoma trivolvis macrostomum (Whiteaves). Ajawaan Lake. A single specimen of large Helisoma is apparently referable to the northern race. It is not *subcrenatum.*

Helisoma infracarinatum F. C. Baker. Waskesiu Lake; Waskesiu Lake at Heart Lakes Portage; Kingsman Lake; Crean Lake. The specimens are like the types from Basswood River Rapids, Ontario.

Menetus exacuous (Say) and *Menetus exacuous megas* (Dall). South end Crean Lake. The form with sharply 'pinched' periphery, called *megas* by Dall, occurs in many lots from northern localities and perhaps should be considered only a 'form' of *exacuous* and not a distinct race.

Gyraulus deflectus obliquus (DeKay). Waskesiu Lake (rare); Waskesiu Lake at Hearts Portage (rare); Crean Lake (common). The specimens are for the most part rather large and quite typical of this race of *deflectus*. *Obliquus* appears to be widely distributed throughout Canada and the northern part of the United States.

Gyraulus hornensis F. C. Baker. Crean Lake, apparently common. See the Canadian Field-Nat., XLVIII, p. 135, fig. A, 1935, for a description and figure of this species. This small planorbid appears to be common over much of the Canadian region.

Gyraulus altissimus (F. C. Baker). Waskesiu Lake. The specimens are white and bleached and may have been washed from a fossil (Pleistocene) deposit. The species is abundant in the fossil faunas of Canada and the United States but its status as a living member of the fauna is not well known.

Physa gouldi Clench. Crean Lake; Ajawaan Lake. The specimens of this species, identified by Dr. Wm. J. Clench, have a somewhat longer spire than the type figured by Dr. Clench (Nautilus, 48, pl. 7, fig. 5) but are well within the range of variation of the species. The record extends the distribution well to the north. A large series of Physae from the lakes of this region would be of value to determine the range of variation of this species and also to establish the possible presence of other species.

Euconulus fulvus (Müller). Between Kingsmere and Waskesiu lakes. Typical.

Vitrina limpida (Gould). Ajawaan Lake. Two specimens rather small.

Retinella binneyana (Morse). Ajawaan Lake. Rather small.

Zonitoides arboreus (Say). Between Kingsmere and Waskesiu lakes. Typical.

Discus cronkhitei (Newcomb). Crean Lake. Typical.

Discuss cronkhitei anthonyi (Pilsbry). Ajawaan Lake. The periphery is bluntly angular but it is apparently not the race *catskillensis.*

Cochlicopa lubrica (Müller). Between Kingsmere and Waskesiu lakes. Typical.

Succinea retusa Lea. Ajawaan Lake. One specimen, typical.

Deroceras campestre (Say). Ajawaan Lake. One specimen, rather small but a form of this species.

CIVILIZATION AND LAND MOLLUSKS IN OHIO

BY A. F. ARCHER

In 1911 Victor Sterki published in the NAUTILUS, Volume 23, pp. 98–101, a paper entitled "Civilization and Snails." In this paper he compared the present condition and abundance of land and fresh-water mollusks with the conditions which obtained fifty or seventy years previously. He referred to the changes produced by deforestation and cultivation, stating that at the time of writing there was in Ohio only about ten or twenty per cent of the number of mollusks that had formerly inhabited the area a half century before. Furthermore, he stated that there were exceptions in the case of some nine species that had actually been benefited by the changes wrought by the white man.

In the light of present-day conditions, Sterki's presentation of the case seems to suffer definitely from under-statement. This is rather surprising from two points of view. First of all, Sterki was a very careful observer, and secondly, it does not seem possible that there have been any great changes within the last twenty-five years. At any rate I have found a rather different situation within the last few years. With this very problem in mind I have made observations on the Ohio land mollusks during four collecting trips undertaken since 1932, and these observations have been further corroborated by work done in the neighboring portions of Michigan.

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Taking up first the condition of the vegetation, we find a set-up which is exactly what Sterki hinted at, and that is that deforestation and cultivation have been very extensive in Ohio. Throughout western Ohio agriculture has served to bring about the elimination of most of the forest cover, except in the ravines and on the slopes of low hills. Otherwise arboreal cover exists chiefly as woodlots. Practically the same statement applies to the level region bordering Lake Erie, for here, too, all the cultivable land has been put to the plow or planted in orchards. In the remaining and more rugged parts of the state the woodland cover is a little more extensive, excepting the eastern portion where coal mines and steel mills have exacted their toll of the forests. In the latter area the forests were almost completely removed in order that the timber might be used as mine props or during one period for charcoal in iron reduction. Coupled with this the farmer required considerable area for agriculture. However, the rather poor soil petered out, and worn-out land was then converted into pasture for live stock. All this leaves only the rugged central and south-central parts with any appreciable woodland, but here again pastures have increased in acreage at the expense of the forest, and finally fires have added to the destruction.

While the picture of the present-day molluscan assemblages is by no means complete, enough has been observed to indicate that the land mollusks have by no means been reduced to the extent that Sterki indicated. Indeed except for two potent but rather transitory factors there appears to be no real reduction in numbers of individuals and only a partial reduction in species. The most depressing factors are heavy grazing and plowing. Moderate grazing does only a small amount of harm to the fauna. Even heavy grazing does not limit the snails, providing there is some protection afforded by rocks, boards and fences. An area from which the grazing factor has been removed is soon extensively re-invaded through the lateral migration of the snails. The same is true in the case of fallow fields. Roadsides, orchards, slopes too steep to be effectively grazed, rural dumps, vacant lots and to some extent lawns in urban centers—these all are favorable for quite a variety of mollusks. The species frequenting open

country are adaptive species. Some of the species occurring in such habitats are apparently too specialized to be abundant under forest conditions, but find ideal conditions where man has altered the vegetation cover. We find various grades of "adaptives," some abundant, some only moderately common, and a few rare, though present. Certain species are so closely tied up with forest cover that they are entirely absent in open country, and are thus automatically eliminated where deforestation has been thorough. A case in point is *Polygyra palliata* (Say).

What Sterki says in regard to various members of the genera, *Zonitoides, Gastrocopta, Vallonia, Gonyodiscus, Hawaiia, Pupoides, Vertigo,* and the slugs is quite in accord with later experience. However, at least species of *Polygyra* live in the open, six of them commonly so. These snails are apt to be overlooked by the casual observer and also by the malacologist, because they live quite out of sight, in grass, herbaceous weeds, and shrubs. Roadside shrubs in Ohio correspond pretty closely with the hedges, a paradise for malacologists in Europe. In short many Polygyras are quite as much at home in the open as the European Helices, but live too inconspicuously except in wet weather. The following species of *Polygyra* are known to live in open country in Ohio:

Polygyra albolabris (Say). This species lives in open fields, in grass, under boards; in roadside thickets, hiding in plant trash; in wild-grape thickets; among rocks in waste-places. This species is less common in the open than in the mature forests.

Polygyra clausa (Say). Very abundant in roadside weeds and on railroad embankments. It is rare in forests.

Polygyra profunda (Say). Present only where the ground is fairly damp and rocky, with a dense, weedy cover. It lives among rocks, in hawthorn thickets, and is most abundant on the rocky deforested bluffs above the Ohio River.

Polygyra thyroidus (Say). In weedy, grassy fields, often under boards; sometimes abundant.

Polygyra pennsylvanica (Green). This species has been observed to live among rocks in a wet pasture in Adams County.

Polygyra fraudulenta Pilsbry. Often abundant in roadside thickets in eastern Ohio.

Polygyra tridentata (Say). This species is very abundant in open country. It lives under rocks, stones, and boards in fields and along roads. It is quite partial to shrubby thickets. It is also common in grass and herbaceous weeds in fields, and lives in urban vicinities among rocks, stones, boards, and rubbish.

Polygyra inflecta (Say). Abundant in orchards and fields under boards and rocks; common in roadside thickets.

Polygyra hirsuta (Say). This species is most common either on the edges of thin, open woods or in open country, but less common in deep woods (except where recent fires have occurred). It is very abundant in fields and pastures in grass and weeds or hiding under logs, boards, and stones. It is apt to be overlooked by the collector who fails to search deep down in the grass. It also favors wild-grape thickets and roadside shrubs, among dead leaves and the fallen stems of certain weeds.

Polygyra fraterna (Say). Like *P. clausa* this snail is notably rare in woods (except where fires have swept through). It is common in grass along roads and in fields, and to some extent stones and boards. The adults tend to shun the deeper shade of shrubs (except during hibernation).

Polygyra monodon (Rackett). Common in meadows, orchards and on railroad embankments, in grass, weeds, and under boards.

Anguispira alternata is a very abundant culture snail in western and northern Ohio, and inhabits walls, roadsides, railroad embankments, etc. It is not very common in grass, and seems to require the adequate shelter of burdocks and other tall weeds, as well as boards, rocks, and shrubs. *Helicodiscus parallelus* is abundant in very rocky places in fields and in walls. *Gonyodiscus cronkhitei anthonyi* is abundant under stones and in weeds along roads, under stones, boards, and rubbish in fields and vacant lots. *Gonyodiscus perspectivus,* although rare in open country, occasionally lives under logs or in grass in fields. *Zonitoides ligerus* lives in grass in fields in large numbers, as well as in weeds, such as soapweed, on railroad embankments; *Z. demissus* is common in grass in fields; *Z. intertextus* lives in grass and weeds (especially on stony ground) in fields, and on rocky river river bluffs in eastern Ohio, but is never common. *Z. arboreus* is fairly frequent in all types of culture zones, rural

and urban. *Gastrocopta armifera* and *Pupoides marginatus* are rare or absent in woods, but abundant in fields, on railroad embankments, and also in rocky, open country. The other *Gastrocoptas* (*pentodon* and *contracta*) are rare in open country, except on stony or rocky ground. *Vertigo tridentata* and *V. ventricosa* have similar preferences, while *V. pygmaea* is less exacting, for it lives in the same habitats as *Vallonia pulchella* and *V. costata.* Both of the Vallonias are common in open country, at least on less acid soils. *Hawaiia minuscula* is indifferent as far as the presence or absence of lime is concerned. It is partial to open grassy and stony country. *Cochlicopa lubrica* is certainly more common in open country than in woodland cover. *Retinella indentata* lives in grass and under stones in fields and other types of open country, and is quite often found buried in plant trash in shrubby thickets; *R. wheatleyi* has almost identical habits, while *R. electrina* is more partial to grass and weeds than to stony cover. Of the genus *Mesomphix* we find *inornatus* and *perlaevis* living under stones on bare river bluffs and in vacant lots, all in eastern Ohio. Neither of the species are at all common in open country. *Agriolimax* (*Deroceras*) *laevis campestris* and *A. agrestis* live in open fields, in grass or under rocks and boards, and also occur in urban surroundings. *Haplotrema concavum* occurs sporadically in grass and weeds in company with its molluscan prey.

From all the evidence gathered so far, it seems clear that a very considerable and adaptive fauna is in the process of taking over the open country created by agriculture, industry, and human occupation in eastern Ohio. In many instances many species are now more abundant per square acre than they were under the old forest conditions. Other species are greatly limited by culture conditions, even though they do affect open country, while some are actually eliminated or locally extirpated. It is significant that the major part of this assemblage of culture species is of American and not of European origin, contrary to the predictions of some naturalists a few years ago.

MICRARIONTAS OF THE SOUTHWESTERN COLORADO DESERT

BY G. WILLETT

For several years past, in an endeavor to clarify the understanding of the *Micrariontas* of southeastern San Diego County and western Imperial County, California, the writer has been accumulating material from that region. Owing to the apparent scarcity of these shells, a considerable amount of effort has been necessary in order to secure enough good specimens for this study. Although dead and faded shells are not infrequently encountered, fresh ones are very difficult to obtain. However, the series now at hand in the Los Angeles Museum and the collection of the writer appears adequate to demonstrate the number of different races, their characters and distribution. A careful study of the above material indicates that there are four forms of *Micrarionta* in the territory under discussion, which includes Borego, Vallecito, Fish Creek, Carrizo and Laguna mountains. As three of these forms are quite similar and possess the common character of diagonal lines of merged papillae on the nuclear whorls, it is probably best to treat them as races of one species, as follows.

MICRARIONTA HARPERI HARPERI (Bryant). *M. ora* Willett.—Range, Vallecito (including Fish Creek) Mountains, north to San Felipe Narrows, Sentenac Canyon (both sides), and head of Blair Valley, and northeast side of Laguna Mountains (Agua Caliente Springs). Specimens examined from east side of Vallecito Mountains, near Borego Townsite, 16 (type lot of *M. ora*); east end of San Felipe Narrows, 37; Yaqui Wells, 3; Sentenac Canyon, 35; Blair Valley, 3; 2–3 miles west of Vallecito, 35, and Agua Caliente, 25.—Total, 154.

The largest of the three races (max. diam., 21.5 mm.), and averaging considerably darker in color. Papillation (in most specimens) only prominent on upper part of early whorls.

The writer's reasons for believing that this is the shell that Bryant (Naut., 28, 1929, p. 143) called *harperi* are: First, it appears to range closer to the "San Jacinto Mountains" and Warner Springs than any other member of the group. Second, no specimen as large as the type of *harperi* (diam., 17 mm.) has been

found among good series of both of the other two races. That Bryant's specimens came from either the San Jacinto Mountains, as now restricted, or Warner Springs, as believed by Berry (Proc. Acad. Nat. Sci. Phila., 74, 1922, p. 94), appears doubtful. No *Micrarionta* has since been found at Warner Springs, though diligently searched for by numerous conchologists. Furthermore, the type of terrain immediately contiguous to Warner Springs is not characteristic *Micrarionta* territory, and is occupied by *Helminthoglypta.* The shell here considered *herperi* occurs in Sentenac Canyon, 16 miles from Warner Springs. Apparently many early collectors failed to realize the importance of exact localities, and specimens from a considerable area might be recorded as from the place where the collector was making his headquarters. It is probable that this method was followed by Bryant. The shell figured by Berry (*op. cit.*) is, through the courtesy of the California Academy of Sciences, now before me. It is far from typical of *harperi,* apparently being an extreme variation. It is not mature and is much heavily papillated than is usual in this race, a feature that probably indicates a tendency toward *M. h. orcutti.*

Bryant's *Epiphragmophora bowersi* (Naut., 13, 1929, p. 122) is probably a *Helminthoglypta.* No known *Micrarionta* from the region has an "olivaceous" epidermis; furthermore, the type locality of *bowersi* is given as San Jacinto Mountains, *Riverside* County, which, on the west side of the mountains, would definitely be outside of *Micrarionta* territory.

MICRARIONTA HARPERI CARRIZOENSIS subsp. nov.—Resembles *M. h. harperi* in general sculpture (lacking strong papillation on later whorls), but much smaller (max. diam., 14 mm.), flatter and lighter colored. The type and thirty additional specimens (all dead) collected by the writer and his wife on hills above Painted Gorge, Carrizo Mountain, Imperial County, California, December 1, 1936.

The type, No. 1049, L. A. Mus., has 4 2/3 whorls, and measures: Max. diam., 14; min. diam., 11.6; alt. 7.7 mm. Paratypes in A.N.S.P. and collection of the writer.

MICRARIONTA HARPERI ORCUTTI (Bartsch).—Differs from the two previous races in rougher surface, and in beingly strongly

papillated, above and below, on all the whorls. Maximum diameter 16 millimeters, hence considerably smaller than *harperi* and slightly larger than *carrizoensis*. Varies somewhat in shape, but very little in sculpture. Known range (specimens taken by the writer), south end of Laguna Mountains, in both San Diego and Imperial counties, from one mile west of Mountain Springs to three miles east of that point. About fifty specimens (mostly dead) have been examined. An unusual feature of this shell is that it occurs, not only among rocks, but also under mats of dead agave plants. This is the only instance of an *Eremarionta* being found in such a situation that has come to the attention of the writer.

This form agrees closely with Bartsch's description and figure of his *orcutti,* from the "Colorado Desert," which, coupled with the fact that Orcutt believed his specimens (the type lot of *orcutti*) came from near Mountain Springs (Berry, *op. cit.*), would appear to justify the belief that this is Bartsch's species. Berry (*op. cit.*) calls attention to the fact that the name *orcutti* is preoccupied in the genus *Micrarionta,* therefore this race will require a new name.

The fourth race found in the territory under discussion here apparently has different affinities, and may be known as:

Micrarionta indioensis remota subsp. nov.—Shell small, thin, umbilicated. Color light horn, with narrow brown band; upper part of last whorl, between band and suture, clouded with grayish. First one and one half whorls with elongated papillae in diagonal rows, as in *indioensis* group; followed by wider spaced, irregularly shaped papillae, which gradually become fainter, being almost imperceptible on the latter part of the last whorl and on the base.

Nearest to *M. i. xerophila* Berry, but differs from that form in smaller size, duller coloration, narrower brown band, and lack of contrast in color between band and rest of whorl.

The type, no. 1050 L. A. Mus., has 4 1/2 whorls and measures: Diam., 13.3; alt., 8 mm. The largest specimen in the type lot measures 14.5 × 9.1 mm. The type and eight additional specimens (mostly dead) were collected by the writer and his wife on Borego Mountain, San Diego County, California, February 14, 1937.

Borego Mountain is an isolated hill just north of the Julian-Kane Springs highway, about seven miles east of San Felipe Narrows, and completely surrounded by the desert floor. It lies between the Vallecitos and the Santa Rosas, being about four miles from the former mountains and nine miles from the latter. The snail, however, is definitely related to the forms inhabiting the Santa Rosas. Although, as previously stated, this shell is very similar in outward appearance to *xerophila,* the genetic relationship of the two races can hardly be very close, as their ranges are forty miles apart, on different drainages, and another race, *indioensis,* occupies intervening territory.

EARLY TERTIARY MOLLUSCA FROM WYOMING

BY LORIS S. RUSSELL[1]

The pioneer work of the territorial surveys, and the early activities of the United States Geological Survey, brought to light a great series of non-marine Molusca from the Upper Crustaceous and Lower Tertiary rocks of the western states. This material, studied principally by F. B. Meek and C. A. White, was described in a number of government reports. The most valuable of these is White's "Review of the Non-marine Fossil Mollusca of North America."[2] Paleontologists of later years, however, have shown little interest in these continental mollusks, apparently because of the long geological range, as well as the marked variability, of many species.

Meanwhile, the succession of Tertiary formation in the west has become much better understood than in the days of Meek and White, largely as a result of the systematic study of mammalian faunas. Various field parties of the American Museum of Natural History, while engaged in collecting remains of mammals, obtained a large number of fossil shells, mostly from the lower Tertiary rocks of Wyoming and New Mexico. This material was described by Professor T. D. A. Cockerell, between 1912 and 1915, in the Bulletin of the American Museum of Natural His-

[1] Published with the permission of the Director, Geological Survey of Canada.

[2] U. S. Geol. Surv., 3rd Ann. Rept., pp. 403–486, 32 pls., 1883.

tory. Cockerell's studies revealed the presence of a rich and interesting molluscan fauna in the lower Tertiary rocks of north-western Wyoming. However, as the stratigraphy of the sediments was not clearly understood at that time, much of the historical significance of the fossils could not be recognized.

More recently the Princeton University Scott Fund expeditions have entered north-western Wyoming, and in the field seasons of 1927, 1928, and 1929, Professor W. J. Sinclair and Dr. G. L. Jepsen, of Princeton University, obtained, beside rich vertebrate collections, an important series of fossil Mollusca. These shells were turned over to the writer for study, and the results from the subject of the present paper. While few additions can be made to the faunas, as described by Professor Cockerell, it is hoped that systematic and stratigraphic revision now possible will be an important contribution to the history of North American non-marine Mollusca.

The writer is very much indebted to Professor Sinclair and Dr. Jepsen for the opportunity to study this fine collection. Dr. H. A. Pilsbry, of the Academy of Natural Sciences, Philadelphia, has rendered valuable assistance in the determination of relationships. Dr. C. A. Reeds, of the American Museum of Natural History, kindly placed at the writer's disposal most of the Wyoming material studied by Professor Cockerell. In addition, the writer has utilized the collections of the United States National Museum. The illustrations of this paper were prepared by the writer.

The stratigraphy of the lower Tertiary rocks of north-western Wyoming has been described in detail by Dr. G. L. Jepsen.[3] However, a general summary of the geological succession here will be attempted before proceeding to the systematic descriptions.

Above the Cretaceous, dinosaur-bearing, Lance formation of Bighorn and Clark's Fork basins there is a series of continental beds that have been called Fort Union. The Clark Fork mammalian fauna was discovered[4] in the upper portion of this series and is correlated with the Upper Paleocene (Thanetian). The

[3] Proc. Amer. Philosoph. Soc., vol. 69, pp. 480–499, 1930.

[4] Granger, W., Amer. Mus. Nat. Hist., Bull., vol. 33, art. 15, p. 204, 1914.

Princeton expeditions have obtained several faunas at lower horizons, including approximate equivalents of the Torrejon (Middle Paleocene) and Puerco (Lower Paleocene) of New Mexico. Numerous fossil shells were collected from the Torrejon portion of the series, which, for purposes of the present paper, will be designated middle Fort Union. A few specimens of mollusks were found in the upper, or Clark Fork, beds.

The lower Eocene, or so-called Wasatch, beds rest upon the Fort Union series. In some places angular unconformities are visible at the contact. Granger[5] divided the "Wasatch" into two stages, a lower or Sand Coulée, and an upper or Gray Bull. These two divisions were distinguished only by the apparent absence, in the lower, of the primitive perissodactyl *Homogalax* (*Systemodon*). As the Princeton expeditions found this genus to be sparingly represented in the Sand Coulée beds,[6] the name Gray Bull is applied to the entire "Wasatch" series of northwestern Wyoming, although it is convenient to designate the lower portion as "Sand Coulée." The Gray Bull strata, in turn, are overlain by the Wind River series, also Lower Eocene, but this does not enter into the present discussion.

The systematic descriptions, which follow, are separated into two sections, one dealing with the Paleocene, or Fort Union fauna, the other with that of the lowest Eocene, the Gray Bull beds.

As associated material was recorded as such in the field, it is possible to list several Fort Union (Paleocene faunules, each of which is a natural association of species.

Faunule from 20-foot sandstone lens, middle Fort Union, on south-west edge of Polecat Bench: *Unio* spp., *Viviparus retusus* (Meek and Hayden), and *Campeloma limnaeiformis* (Meek and Hayden) (?).

Faunule from middle Fort Union beds in range 99 west, township 56 north, section 11 or 12: *Unio wasatchensis* Cockerell (?), *Viviparus paludinaeiformis* (Hall), *Lioplax nebrascensis* (Meek and Hayden), and *Goniobasis tenuicarinata* (Meek and Hayden) (?).

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[5] *Op cit.*, pp. 203, 205.

[6] Jepsen, G. L., Proc. Amer. Philosoph. Soc., vol. 69, p. 119, 1930.

The fauna known from the middue Paleocene beds is, with one or two exceptions, a typical Paleocene assemblage, both as to the species present and the associations of species in faunules. Such a fauna possesses much closer relationships with the mollusks of the continental Upper Cretaceous formations of the west than it does with known faunas of the Lower Eocene. The middle Fort Union shells from north-western Wyoming represent, in almost every case, either descendants of species known in the Upper Cretaceous non-marine faunas or actual survivors of such species.

It should also be noted that only fluviatile and lacustrine genera are present in the middle Fort Union fauna of the present collection.

In contrast to the assemblage just discussed, the imperfect shells from the Clark Fork, or upper Fort Union, beds belong to one fluviatile and one terrestrial genus, and strongly suggest species of the Lower Eocene fauna.

The Lower Eocene faunules of associated species in the "Sand Coulée" and upper Gray Bull beds show a uniformity of composition that is in contrast to the associations in the underlying Paleocene.

Faunule from "Sand Coulée" beds in Little Sand Coulée basin, east of mouth of Pat O'Hara creek: *Helicina evanstonensis* (White), *Physa* sp., *Polygyra veternior* (Cockerell), *Gastrodonta coryphodontis* Cockerell, *Oreohelix megarche* Cockerell and Henderson, *Oreohelix grangeri* Cockerell and Henderson, *Gonyodiscus ralstonensis* (Cockerell), *Grangerella megastoma* Cockerell, and *Grangerella sinclairi* (Cockerell).

Faunule from "Sand Coulée" beds north of divide at head of Little Sand Coulée: *Viviparus wyomingensis* Meek, *Goniobasis carterii* Conrad, and *Oreohelix grangeri* Cockerell and Henderson.

Faunule from upper Gray Bull beds fifteen miles west of Basin near Omorlamphus locality: *Unio sinopae* Cockerell(?), *Helicina evanstonensis* (White), *Viviparus jepseni* Russell, *Planorbis storchi* Russell, *Physa bridgerensis* Meek, *Physa pleromatis* White, *Polygyra veternior* (Cockerell), *Oreohelix megarche* Cockerell and Henderson, *Oreohelix grangeri* Cockerell and Henderson, *Gonyodiscus ralstonensis* (Cockerell) and *Grangerella sinclairi* Cockerell.

Turning to the consideration of entire faunas, it will be seen from the locality data given for the various species that there is slight differences between the fauna of the "Sand Coulée" beds and that of the upper Gray Bull. *Goniobasis carterii* and the Viviparidae seem to be more common in the lower horizons, but otherwise the differences can be ascribed plausibly to the chances of collecting. We may consider, therefore, the Mollusca of the Gray Bull stage, using the latter term in the comprehensive sense here adopted, as constituting a single, well-marked fauna. The species of this Lower Eocene fauna are, with few exceptions, either confined to the Gray Bull beds, or are known elsewhere only from Eocene strata. As to habitat, almost three-quarters of the genera represented are terrestrial, and if species and individual specimens are considered, the aquatic element becomes almost insignificant.

The almost continuous section of lower Tertiary rocks in northwestern Wyoming contains abundant remains of non-marine Mollusca, which show the change from Paleocene to Lower Eocene faunas in a relatively local area. The oldest fauna is in the middle Fort Union, and consists of aquatic species, mostly of Paleocene and Upper Cretaceous affinities. Presumably the great change began in late Paleocene time for the next stage, the Clark Fork or upper Fort Union, contains a few shells of Eocene type. The Lower Eocene "Wasatch" or Gray Bull stage contains a fairly uniform fauna, predominantly terrestrial in habitat and of Eocene affinities. Several species present here also occur in later Eocene horizons, suggesting that when the fauna of the Wind River group is known it will be found to be essentially like that of the Gray Bull.

The cause of this profound change in molluscan fauna is almost certainly to be found in the elevation of the Rocky Mountains. While it is known that uplift went on intermittently throughout the Late Cretaceous and Paleocene, a very important time of orogeny occurred, as shown by unconformities, following the deposition of the Clark Fork stage. This elevation and accompanying change of climate, while probably not profound, were sufficient to drive out or destroy the aquatic faunas, and to provide the correct environment for a dominantly terrestrial fauna,

which was already migrating in, presumably from the north. It is reasonable to suppose that this fauna, in turn, was modified by the renewed uplift of late Eocene or Oligocene time.

SNAILS AS HOSTS AND CARRIERS OF NEMATODES AND NEMATOMORPHA

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Snails, in their rôle as intermediate hosts of parasites, are generally thought of as hosts of trematodes, more especially because some of these trematodes are of considerable economic importance. However, snails are also of considerable interest as hosts of nematodes. The nematode fauna of snails received attention from helminthologists at an early date, but the subject was subsequently rather neglected until within the past two years. Such peculiar phenomena as the ability of so-called "free-living" and plant-parasitic nematodes to survive passage through the intestine of snails, and the occurrence in snails of nematodes belonging to the same genera as nematodes found in Amphibia, have raised interesting problems in the host-parasite relationships of these nematodes.

This problem in snail-nematode relationship may be attacked, first, by separating the nematodes found in snails into six groups on the basis of the mode of life of the nematodes involved. These six groups are as follows: (1) Nematodes normally free-living (living upon decaying plant or animal matter) and plant parasites which may pass through the digestive tract uninjured; (2) nematodes living as obligatory parasites in the digestive tract; (3) nematodes living as parasitic larvae in the foot muscle and having a free-living adult stage; (4) adult nematodes living in the genital organs; (5) agamic nematodes and Nematomorpha which live in the body cavity and leave the host upon reaching maturity, subsequently passing the remainder of their life as

free-living forms; and (6) nematode parasites of vertebrates, the larval stages of which nematodes occur in snails. These groups are now taken up individually.

1. The members of the first group are free-living and plant-parasitic nematodes. They are usually rather small, from 400 μ to 2 mm. long. Since they do not, under ordinary conditions, pass any part of their life in the snail, their association with snails can best be considered as facultative or causal parasitism. The first observation of this type of snail-nematode relationship was made by Schneider (1859), who described *Leptodera foecunda* (=*Pelodytes hermaphroditius*) from the slime of *Arion empiricorum*. The presence of free-living nematodes in the digestive tract of snails was first mentioned by Cobb (1888). This writer expressed the opinion that the digestive fluids of the snail were not sufficiently strong to injure free-living nematodes. He listed the following nematodes from the feces of the "Weinbergschnecke" (*Helix pomatia*): *Aphelenchus parietinus, Tylenchus filiformis, Cephalobus elongatus, Rhabditis dolichura,* and *Tylenchus lameliferus*. These nematodes, in so far as can be determined from Cobb's brief discussion, were not found encysted or ensheathed. The first report of an encysted nematode was that of Maupas (1899) who described as *Rhabditis causanelli* a nematode which he found encysted in the intestine of *Arion empiricorum* v. *ater, Arion ater* (L.,) (syn. *A. empiricorum* Fér.); he obtained the adult stage of this nematode by culturing the larvae in decaying organic matter.

The present writers have found *Pathoaphelenchus parietinus* (=*Aphelenchus parietinus*) and *Cephalobus elongatus* to be rather common in the intestine of *Philomycus dorsalis* in that part of Virginia bordering on the District of Columbia. *Pathoaphelenchus parietinus* is a plant parasite which normally inhabits the buds and leaves of a wide variety of plants, and may cause considerable damage to a host plant. *Cephalobus elongatus* is capable of living free in the soil, but is also common in diseased plants and has been considered in some instances a secondary invader of plant tissue. Three other species of nematodes found by the writers in the intestines of *Polygyra albolabris* in the region of Glencarlyn, Va., are as follows: *Aphelenchus avenae,* normally

associated with plants, and *Acrobeloides minor* and *Rhabditis monhystera,* both of which are generally found in decaying vegetable matter.

In the above instances discovered by the writers the association of the nematodes with the snails appears to be purely accidental and cannot be considered a necessary association, *i.e.,* parasitism; nevertheless, this association may be of some significance, for snails must be considered as possible carriers of plant parasites and may play a rôle in the spread of plant diseases caused by nematodes. This type of snail-nematode relationship should certainly be considered in connection with experimental work on plant diseases.

2. The second group, obligatory parasites living in the intestinal tract of snails, contains representatives of two families of nematodes, the Angiostomidae and Cosmocercidae. There is at present but one known representative of the Angiostomidae in snails, namely, *Angiostoma limacis.* This species was first described by Dujardin (1845) from the intestine of *Limax rufus* (s.o. *Arion ater* vide Taylor, 1907) and later redescribed by Schneider (1866) as *Leptodera angiostoma* (= *Angiostoma limacis*) from the intestine of *Limax ater* (s.l. *Arion ater* vide Taylor, 1907). It may be interesting to note in this connection that the senior writer has found a species very closely related to *Angiostoma limacis* in the intestine of a salamander, *Plethodon cinereus.*

The writers have collected members of the Cosmocercidae, from two species of small hosts, *Opeas goodalli* and *Deroceras agreste,* which were obtained from the greenhouses of the U. S. Department of Agriculture. These species appear to belong to the genus *Cosmocercoides* Wilkie, 1930. The adults inhabit the intestinal tract of the host; the larvae were found in the eggs of the slug, *Deroceras agreste.* These larvae agree in all respects with those described from the egg of "limace grise" (the grey slug) by Barthelmy (1858), to which larvae he applied the name *Ascaroides limacis.* On the basis of this evidence it appears possible that *Ascaroides limacis* may belong in the family Cosmocercidae, but it is impossible to identify the form in question with existing genera or species of that family owing to the absence of a description of the adult stage.

Another representative of the Cosmocercidae, *Trionchonema rusticum*,[1] was described by Kreis (1932) from *Polygyra espicicola* (s.o. *P. espiloca*).

The species *Ascaris cylindrica*, which Leidy (1849) described from the intestine of *Helix alternata* (s.o. *Anguispira alternata*) and *Angiostoma helicis*, and which Conte and Bonnet (1903) described from the gonads and gonoducts of *Helix aspersa*, also appears to be most closely related to the Cosmocercidae so far as can be judged from available descriptions of this form.

The genus *Cosmocercoides* as well as other genera of the family Cosmocercidae are generally known as parasites of amphibians and reptiles. It is not uncommon for invertebrates to serve as intermediate hosts of vertebrate parasites, but *Angiostoma* and *Cosmocercoides* appear to be the first genera of nematodes known to contain species which are parasites both of vertebrates and invertebrates. The similarities of habitat of snails and salamanders may in part explain the presence of the adult stage of members of the group in both types of host.

3. The third group, parasites living as larvae in the foot-muscle and having a free-living adult stage, contains a single representative *Alloionema appendiculata* Schneider (1859). This species was first described from *Arion ater*, and was later refigured and redescribed in considerable detail by Claus (1868). *Alloionema appendiculata* has not been observed in recent years and its systematic position is still uncertain.

4. The fourth group, adult nematodes living in the genital organs, likewise contains but a single representative, *Leptodera flexilis* Dujardin, 1845. It was originally reported from *Limax cinereus*.

5. The fifth group, nematodes and Nematomorpha, which live as agamic forms in the body cavity and leave the host upon reaching sexual maturity, contains several representatives, as follows: *Gordius aquaticus* from *Lymnaea* sp. *L. vulgaris* and *L. ovata; Gordius villoti* from *L. ovata; Paragordius tricuspidatus* from *L. ovata; Parachordodes tolosanus* from *Lymnaea* sp.; *Mermis nigrescens* from *Limax agrestis* (s.o. *Deroceras agrestis*); and *Mermis albicans* from *Succinea putris*.

[1] The genus *Trionchonema* Kreis (1932) appears to be a synonym of *Cosmocercoides* Wilkie, 1930.

6. Of the sixth group, larval stages of nematodes the adults of which are parasites of vertebrates, only one species is known, namely, *Müllerius capillaris.* Hobmaier and Hobmaier (1929 and 1930) have reported this species from the following hosts: *Limax cinereus, L. flavus, Agriolimax agrestis* (s.o. *Deroceras agreste*), *Arion circumscriptus, A. empiricorum, A. hortensis, A. subfuscus, Helix hortensis, H. pomatia, Succinea putris, S. pfiefferi, Hygromia* (*Fruticicola*) *hispida, Monacha umbrosa* (s.o. *Hygromia umbrosa*), *M. bidens, Cepaea hortensis* (s.o. *Helix hortensis*), *Cingulifera planospira, Helicigona* (*Chilostoma*) *planospira* and *Helicigona* (*Arianta*) *arbustorum. Müllerius capillaris* in the adult stage is an economically important parasite of sheep. It would be rather surprising if future investigations do not disclose the fact that snails can serve as intermediate hosts for many nematode parasites of vertebrates.

In addition to the above records there are a few nematodes from snails concerning which so little is known that the writers hesitate to place them in any of the above groups. They are as follows: *Dubium* Rudolphi, 1819, from *Helix nutris* (= (?) *Succinia putris*); *Phacelura paludinae* Ehrenburg in Hemprich and Ehrenburg, 1828, from *Bythinia tentaculata* and *Vivipara vera; Phacelura inquilina* (Müller, 1774) Diesing, 1851, from *Lymnaea auricularia, Physa fontinalis,* and *Planorbis corneus;* and *Phacelura lymnaei* Diesing, 1851 (= *Filaria lymnaei-stagnalis* Diesing 1851), from *Lymnaea stagnalis.*

The writers are at present continuing investigations on the nematode fauna of molluscs and would appreciate aid from malacologists either in the form of living hosts or preserved nematodes obtained from snails.

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63. Thomas Bland (an account of his life and work). American Journal of Science, Vol. XXX, Nov., 1885.

64. A Second Supplement to the Fifth Volume of the Terrestrial Air-breathing Mollusks of the United States and Adjacent Territories. Bull. Mus. Comp. Zool., Vol. XIII, No. 2, pp. 26, 3 plates, Dec., 1886.

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II. *A List of the Scientific Papers Published in Connection With Thomas Bland, 1869–1873*

67. Land and Fresh-water Shells of North America, Part I, Pulmonata, Geophila. Pp. 316 and wood-cuts, Smithsonian Misc. Coll., Washington, 1869.

68. Notes on Lingual Dentition of Mollusca, No. I. Ann. Lyc. Nat. Hist. N. Y., Vol. IX, pp. 281–295, wood-ucts, Feb., 1870.

69. Notes on Lingual Dentition, No. 2. Am. Journ. Conch., Vol. VI, pp. 202–215, wood-cuts and pl. IX, April, 1871.

70. Note on the Genus *Pineria,* and on the Lingual Dentition of *Pineria Ciequensis* Pfr. Ann. Lyc. Nat. Hist. N. Y., Vol. X, pp. 22–27, Feb., 1871.

71. Notes on the Lingual Dentition of *Pompholyx effusa.* Am. Journ. Conch., Vol. VI, pp. 312–313, pl. XVIII, June, 1871.

72. On the Lingual Dentition of *Helix turbiniformis* Pfr., and Other Species of Terrestrial Mollusca. Ann. Lyc. Nat. Hist. N. Y., Vol. X, pp. 79–82, pl. II, July, 1871.

73. On the Lingual Dentition of *Clausilia tridens* Chemn. Am. Journ. Conch., Vol. VII, pp. 28–29, pl. II, Aug., 1871.

74. On the Lingual Dentition of *Helicina occulta.* Am. Journ. Conch., Vol. VII, pp. 29–30, pl. II, Aug., 1871.

75. On the Lingual Dentition of *Limnaea appressa* Say, and *Limnaea megasoma* Say. Am. Journ. Conch., Vol. VII, pp. 161–162, pl. XII, Nov., 1871.

76. On the Lingual Dentition of *Veronicella.* Am. Journ. Conch., Vol. VII, pp. 163–164, pl. XII, Nov., 1871.

77. On the Systematic Arrangement of North American Terrestrial Mollusca. Ann. Lyc. Nat. Hist. N. Y., Vol. X, pp. 158–169, April, 1872. (In connection with the above "Note on *Helix inversicolor* Fer. and other species from Mauritius," pp. 169–170, appeared.)

78. On the Lingual Dentition and Jaws of Terrestrial Mollusca, No. 3. Am. Journ. Conch., Vol. VII, pp. 174–184, March, 1872.

79. On the Lingual Dentition of *Blandiella, Geomelania* and *Amphibulima.* Am. Journ. Conch., Vol. VII, pp. 185–186, pl. XVII, March, 1872.

80. On the Lingual Dentition of *Nanina.* Am. Journ. Conch., Vol. VII, pp. 188–189, pl. XVII, March, 1872.

81. On the Lingual Dentition of *Macroceramus gossei* Pfr. Am. Journ. Conch., Vol. VII, p. 187, pl. XVII, March, 1872.

82. On the Generic Position of *Helix newberryana.* Am. Journ. Conch., Vol. VII, pp. 190–191, pl. XVII, March, 1872.

83. Notes on the Lingual Dentition of Certain Species of North American Land Shells. Proc. Acad. Nat. Sci. Philadelphia, pp. 135–137, Sept., 1872.

84. On the Relations of Certain Genera of Terrestrial Mollusca of, or Related to, the Sub-family *Succiniae,* With Notes on the Lingual Dentition of *Succinea appendiculata* Pfr. Ann. Lyc. Nat. Hist. N. Y., Vol. X, pp. 198–207, pl. IX, Oct., 1872.

85. Description of *Hemphillia,* a New Genus of Terrestrial Mollusks. Ann. Lyc. Nat. Hist. N. Y., Vol. X, pp. 208–211, pl. IX, Oct., 1872. (*Hemphillia glandulosa* described.)

86. On the Lingual Dentition of Certain Terrestrial Pulmonata, Foreign to the United States, (with) Additional Note on the Genus *Amphibulima.* Ann. Lyc. Nat. Hist. N. Y., Vol. X, pp. 219–225, Dec., 1872, Jan. 1873.

87. On the Lingual Dentition of *Gaeotis,* Foreign to the United States, (with) Additional Note on the Genus *Amphibulima.* Ann. Lyc. Nat. Hist. N. Y., Vol. X, pp. 252–255, pl. XI, Jan., 1873.

88. Note on a Curious Form of Lingual Dentition in *Physa,* Foreign to the United States, (with) Additional Note on the Genus *Amphibulima.* Ann. Lyc. Nat. Hist. N. Y., Vol. X, pp. 255–257, pl. XI, Jan., 1873.

89. On the Lingual Dentition and Jaw of Certain Terrestrial Pulmonata from the United States, with Remarks on Their Systematic Value. Proc. Acad. Nat. Sci. Philadelphia, pp. 240–256, pl. I, 1873.

90. On *Prophysaon,* a New Pulmonate Mollusk, on *Ariolimax,* on *Helix lychnuchus* and Other Species. Ann. Lyc. Nat. Hist. N. Y., Vol. X, pp. 293–311, pls. XIII–XIV, 1873.

91. On the Lingual Dentition and Anatomy of *Achatinella,* and Other Pulmonata. Ann. Lyc. Nat. Hist. N. Y., Vol. X, pp. 331–351, pls. XV–XVI, Nov., 1873.

NOTES AND NEWS

Bohumil Shimek.—All conchologists will greatly mourn the loss of this eminent authority on loess mollusks, who died January 29th, at his home in Iowa City.—H. A. P. & H. B. B.

Miss Theodora Willard, Secretary of the Boston Malacological Club, died in Boston, February 17.

A double-lipped Strombus.—A female specimen of *Strombus bituberculatus* Lam., taken in Lake Worth, Florida, near the lower inlet, after forming an expanded lip resumed growth from the inner margin of the expansion, forming a second thick, expanded lip about 13 mm. in advance of the first one. The shell is of the small, east coast variety, 63 mm. long.—Thomas McGinty.

The American Malacological Union will hold its seventh annual meeting in the University of Michigan Museum, Ann Arbor, Michigan, August 3 to 5 inclusive. Titles of papers with

approximate time for delivery may be sent to Mr. Calvin Goodrich at the University Museum or to the Financial Secretary of the Union, Mrs. Harold R. Robertson, Buffalo Museum of Science, Buffalo, New York.

ACANTHOCHITONA PYGMAEA (Pils.), known from Cedar Keys and Key West, was taken this year at Boynton, the first record from the east coast of Florida.—THOMAS MCGINTY.

THE CONCHOLOGICAL CLUB OF SOUTHERN CALIFORNIA elected Dr. H. A. Pilsbry an Honorary Member at the meeting of February 9.

WEST FLORIDA was the conchologist's Mecca last year, when one of the best meetings of the American Malacological Union was held at St. Petersburg. This year's conchological meetings in Florida, though informal, were scarcely less interesting. At Lantana, with the neighboring Lake Worth and Boynton, the group consisted of Mr. Maxwell Smith, who is about to publish a manual of East Coast shells, Mr. Paul P. McGinty and his sons Paul and Tom, both accomplished collectors, Mr. Edw. P. Burch, and the senior editor of NAUTILUS. For a few red letter days we were joined by Dr. and Mrs. B. R. Bales, on their way up from Key West. Mr. Frank Lyman and Mrs. Lyman, who are always finding something interesting, represented the commercial side of the shell game, and Ted Dranga, the Honolulu shell and coral diver, tried his skull on Boynton beach. It was pleasant also to meet the Miami group, Grimshawe, Frampton, Pflueger, Deckert and others, and to see their beautiful collections of tree shells.

In West Florida a "shell fair" was held on February 25 and 26 in the Community House at Sanibel Island, under the direction of Dr. Louise Perry. There were many beautiful exhibits, almost wholly shells of Sanibel Island and vicinity. The attendance was very large, but of course mainly of those interested in shells for their beauty rather than their scientific value.

An attractive exhibit of *Liguus* and *Polymita picta* was made by Tom McGinty at the annual Palm Beach Flower Show. Shells were shown on trees as they live in the hammocks, as well as in

more formal arrangement. The living *Liguus,* moving about, had a crowd of admirers.

With these events and several collecting trips each week for marine or land shells and Pliocene fossils, the time was too short. It is rumored that the Florida members of the Malacological Union may strike for longer hours and more days in the week.

CRATENA VERONICA VERRILL.—While collecting on the coast of Maine at South Harpswell from May 9 to 11, 1936, two specimens of *Cratena veronica* Ver. were taken on the sponge, *Halichondria panicea* Pal. just below low water mark. One animal was 12 mm. and the other 8 mm. in length. They were laying eggs when taken. This collection extends the range for this species from Gloucester, Mass., to South Harpswell, Maine, 90 miles north.—HENRY D. RUSSELL.

THE TYPE OF AMICULA GRAY.—The type of this loricate genus has long been considered to be the Arctic *vestita* Sowerby, dating the formation of the genus from 1847. However, in the second edition of Sowerby's Conchological Manual, 1842, on page 61, we find that *Amicula* is "formed for the reception of *Chiton amiculatus* Auct., the valves of which are covered by an integument; so as to be completely hidden externally." We see that this is not the true *amiculatus* Pallas, but the shell so named and figured in Sowerby's Conchological Illustrations (1840 or 1841), figure 80. This is the species now called *Cryptochiton stelleri* Midd. *Amicula* Sowerby, 1842, will therefore replace *Cryptochiton* Middendorff, 1847, while *Amicula* Gray, 1847, and subsequent authors will become a synonym of *Symmetrogephyrus* Middendorff, 1847, of which the type is *Chiton pallasii* Midd., a species closely allied to *vestita* Sowerby. It might be mentioned that in 1843, in the second volume of Dieffenbach's Travels in New Zealand, page 246, Gray used *Amicula* for the single species *Chiton monticularis* Q. & G., a synonym of *Cryptoconchus porosus* Burrow. *Amicula* Gray, 1843 (not *Amicula* Sowerby, 1842, nor *Amicula* Gray, 1847) will therefore fall into the synonymy of *Cryptoconchus* 'Blainv.' Burrow.—H. A. REHDER.[1]

[1] The data given above on *Amicula* and *Cryptochiton* have been discussed by Iredale and Dall, Nautilus 39, 1925, pp. 47, 75.—ED.

CONGERIA LEUCOPHAEATA (CON.) IN THE HUDSON RIVER.—Recently Mr. Henry K. Townes of Cornell University sent to the National Museum a collection of Crustacea from the Hudson River. Among them were two specimens of *Congeria* (*Mytilopsis*) *leucophaeata* Conrad, collected alive at Haverstraw, Rockland County, New York, about 30 miles above New York City. A perusal of the literature dealing with this species discloses no record further north than Chesapeake Bay. This then constitutes a notable extension of the range of this brackish-water form. —H. A. REHDER.

POLYGYRA CADDOENSIS ARCHER.—In the NAUTILUS, July, 1935, Vol. XLIX, pp. 19–20, I described a new species called *Polygyra caddoensis*. The description was based on some specimens collected in 1913 by H. E. Wheeler at Caddo Gap, Montgomery Co., Arkansas. Very shortly after the paper was sent in to the NAUTILUS, I undertook an expedition to Arkansas under the auspices of the University of Michigan and the Alabama Museum of Natural History. I found this species in fair abundance at Caddo Gap. Some sixty-one specimens were collected. The snails were found living under stones, rocks, and chunks of wood. They appear to be especially partial to charred pine wood. They occur from the base of the mountain to the summit, occupying all types of situations, oak-hickory ravines, the thin, open woods, and occurring commonly in open clearings along the road and at the base of the mountain. With them were living the closely related *P. uncifera* Pilsbry. The latter is three times more common, for nearly two hundred were collected in the same space of time.—A. F. ARCHER.

PHYSA CANADENSIS WHITEAVES.—Whiteaves (1885, Geol. Survey of Canada, Contrib. to Paleont. **1**, p. 14, pl. 2, fig. 5, 5a–b) describes a Cretaceous fossil as *Physa copei* var. *canadensis*. There is no question but that Whiteaves had two species judging from the excellence of his figures. Russell (1926, Trans. Royal Soc. Canada (3), **20**, pt. 2, sec. 4, pp. 215–219) deals with the same sort of fossil material. Russell "reproposed" the name *P. canadensis* and describes 4 new varieties, two on additional material,

two on the figures of Whiteaves. The name *canadensis* is left out in the cold, being retained only as a convenient heading under which to group the four new names.

It is a perfect legal procedure to split up any previously described species when the figures or type specimens show that actually the original name covered more than one species. It is at least courteous, not to mention nomenclatorial rules, that the original name be retained for one of the species in question. No fault is here found in the work of Russell, only the methods he used in handling the names. The name *canadensis* was retained, but the types of all the varieties were placed under new names. Any subsequent worker may possibly raise these varietal names to specific standing and consequently *canadensis* would disappear. The following synopsis reestablishes Whiteaves' name.

PHYSA CANADENSIS CANADENSIS Whiteaves (*Physa copei* var. *canadensis* Whiteaves, 1885, Geol. Survey of Canada, Contrib. Canad. Paleont. **1**, p. 14, pl. 2, figs. 5, 5a–b; [types here designated as figures 5 and 5b on plate 2]). *Physa canadensis* var. *ampla* Russell 1926, Trans. Royal Soc. Canada (3), **20**, pt. 2, sec. 4, p. 217, pl. 2, fig. 8).

PHYSA CANADENSIS PARVATURRIS Russell (loc. cit., p. 216, pl. 2, fig. 3–4).

PHYSA CANADENSIS MEDIA Russell (loc. cit., p. 216, pl. 2, fig. 5).

PHYSA CANADENSIS TENUIS Russell (loc. cit., p. 216, pl. 2, figs. 6–7; based on Whiteaves' fig. 5a, pl. 2, a new type is instituted from a different locality.—WILLIAM J. CLENCH.

DR. KATHARINE JEANNETTE BUSH, the first woman to be granted the doctor's degree in zoology at Yale University, died at Hartford, Conn., on January 19, following an incapacitating illness of nearly ten years. She had just passed her eighty-first birthday. Her professional career began in 1881, as assistant to the late Professor A. E. Verrill in studies on the marine invertebrates collected by the U. S. Fish Commission off the Atlantic Coast and in the Gulf Stream. She was later associated with the U. S. National Museum and with the Peabody Museum of Yale. Her publications consisted of systematic papers on the classification of annelids and mollusks, with descriptions of many new species.—SCIENCE.

A genus of palms from No Name Key, Florida, has been named *Simpsonia* by O. F. Cook (Science 85: 333) in honor of Charles T. Simpson.

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EDITORS AND PUBLISHERS:
HENRY A. PILSBRY, Curator of the Department of Mollusca, Academy of Natural Sciences, Philadelphia
H. BURRINGTON BAKER, Associate Professor of Zoology, University of Pennsylvania

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EDITORS AND PUBLISHERS:
HENRY A. PILSBRY, Curator of the Department of Mollusca, Academy of Natural Sciences, Philadelphia
H. BURRINGTON BAKER, Associate Professor of Zoology, University of Pennsylvania

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